

modern machine shop

**THREAD
ROLLING**
See Page 104

**MACHINE
CONTROL**
See Page 118

**GLOSSARY OF
MEASUREMENT**
See Page 128

**JULY
1956**



**Over 1400 Standard End Mill
Types and Sizes**

You can select a standard end mill
design that will best meet your needs.

•

PUTNAM TOOL COMPANY
2981 Charlevoix • Detroit 7, Mich.



Excellent tool life... high quality threads

A prominent nipple manufacturer in Texas (name on request) manufactures nipples from seamless tubing, galvanized pipe and heavy wall tubing—in sizes from 1/8-inch to 8 inches. Landis Dual Head Automatic Threading Machines are used.

Because of the difficult nature of this operation—the manufacture of high pressure, precision fittings—Texaco Lubrication Engineering Service selected *Texaco Sultex Cutting Oil A*—an active sulfur-type oil especially designed for high-speed threading, broaching and tapping. Results have been: excellent

tool life, high quality threads, high production rate.

There is a complete line of *Texaco Cutting, Grinding and Soluble Oils* to enable you to do your machining better, faster and at lower cost. Texaco Lubrication Engineering Service will gladly help you select the proper ones.

Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

☆ ☆ ☆

The Texas Company, 135 East 42nd Street, New York 17, N.Y.



TEXACO

**CUTTING, GRINDING,
SOLUBLE AND
HYDRAULIC OILS**

JULY

1956

Vol. 29

No. 2

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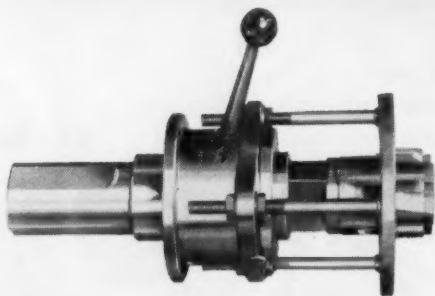
Member



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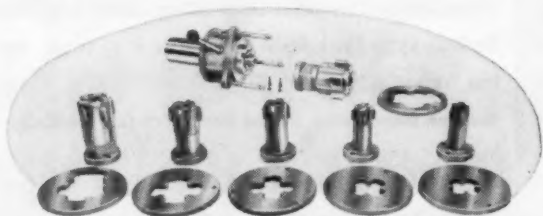
(For more information on cover advertisements, use Reader Service Cards
opposite pages 32 and 324.)



ALT Taps For Straight Threads

LANDIS ALT Collapsible Taps are available for producing straight threads from $1\frac{1}{4}$ " to $13\frac{1}{4}$ " in diameter. These taps feature a rugged construction and design simplicity which enable maximum chaser rigidity, and the same tap may be used for either stationary (shown) or rotary application.

The basic design of all LANDIS Tap Heads assure maximum bearing support between the chaser, plunger and tap head body. Heavy metal sections provide rigidity to the chasers and plunger, particularly at the points where cutting strains are transmitted.



Wide Range Coverage

Detachable heads are a feature of all LANDIS Collapsible Taps. This design allows tapping a wide range of thread diameters with minimum tooling—for example, the 3ALT body using 6 different heads will tap all diameters from $1\frac{1}{4}$ " to $3\frac{1}{4}$ ". Each tap head itself has a wide threading range—the $1\frac{1}{2}$ " head will thread from $1\frac{3}{8}$ " to $1\frac{5}{8}$ ", the 2" from $1\frac{7}{8}$ " to $2\frac{5}{8}$ ", the 3" from $2\frac{3}{4}$ " to $3\frac{1}{4}$ ".

For more data circle 201 on Reader Service Card

DUST



CYCLONE



FILTER

COLLECT IT

WITH

Hammond
DUSKOLECTORS

Your plant produces dust in a surprising number of locations. By collecting it at the source you:

- Provide healthier working conditions
- Protect costly machines
- Reduce cleaning and painting costs

Hammond Duskolectors don't cost—they pay!

Clip this page to your letterhead. Duskolector catalog with helpful engineering information and interesting installation views will be sent at once.

Hammond Machinery Builders
INC.

1615 DOUGLAS AVENUE



KALAMAZOO, MICHIGAN

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July, 1956

modern machine shop 3

CUSTOM DIES

by WHISTLER

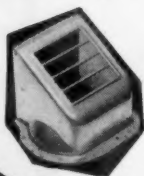
- ✓ EXPERIENCE
- ✓ STAFF
- ✓ CAPACITY

For nearly half a century S. B. Whistler & Sons, Inc. have been manufacturing custom dies for the top names in industry. With our large staff of experienced engineers and skilled tool and die makers, supported by extensive mechanical facilities, we offer a dependable die making service to any manufacturer whose product calls for the working of sheet metals.

YOU ARE INVITED to send us your specifications and drawings for cost estimates and delivery schedule. See for yourself how Whistler dies are stepping up production and cutting costs in plants coast to coast.



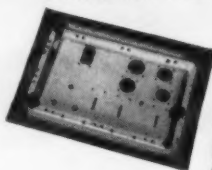
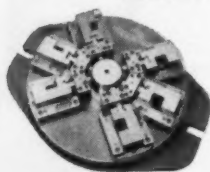
DRAWING



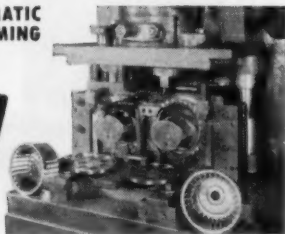
CAM
PIERCING



COMPOUND
BLANKING
AND PIERCING



SEMI-AUTOMATIC
LANCE AND FORMING



S. B. WHISTLER & SONS, INC., 740 Military Road, Buffalo 23, N. Y.

ADJUSTABLE, MAGNETIC and CUSTOM DIES FOR ALL INDUSTRY

Direct Factory Representatives Located in Principal Industrial Areas

Visit us at Booth 2014—National Metal Exposition, Cleveland—Oct. 8 to 12

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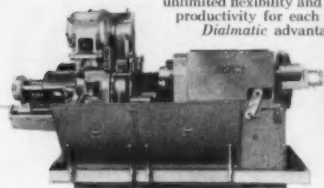
**MODEL
AB
DIALMATIC**



**MAX.
CAPACITIES:**

1 3/4" 3"
1 1/2" 4 1/4"
2 1/2" 5 3/4"

The most modern automatic available today. Equipped with Electronic Feed Drive. Turret tool feeds are infinitely adjustable, set by control panel dials. On 1 3/4" and 1 1/2" sizes, turret feeds and spindle speeds are electronically controlled. The 2 1/2" and 3" AB can be quickly converted to a chucker. Ease and rapidity of set-up, unlimited flexibility and maximum productivity for each tool are Dialmatic advantages.



**MODEL
AW**

**MAX.
CAPACITIES:**

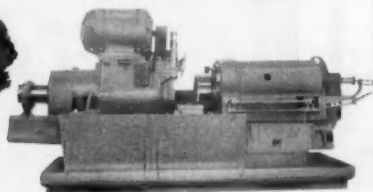
2 1/2"
4 1/4"
5 3/4"

Differs from Model AB design only in that variable turret tool feeds are obtained through an improved mechanical drive. These are high-speed, accurate, rugged machines, quickly set up, easily operated. Their simplified mechanical design assures the user the utmost in freedom from downtime.

**MODEL
A**

**MAX.
CAPACITIES:**

1 1/4"
8"



More than seven hundred in use have proved Clevelands time-tested *universal camming*. No special cams required to perform any work within the capacity of the machine.



**MODEL
B**

**MAX.
CAPACITIES:**

1 1/2"
2 1/2"

**MODEL
B-18**

**MAX.
CAPACITIES:**

1 1/4"
1 1/2"
2 1/2"

Model B's do not have tool turrets. Tooling is mounted on a milling slide capable of turning several OD in one operation, plus one end working operation, and on two cross slides where forming and additional turning can be performed. Ideal for work involving multiple diameters, shoulders, chamfers, tapers, etc. Model B-18 handles work up to 18" long. A 24" machine is also available.

there's a

CLEVELAND

**Single Spindle Automatic
exactly right for your
turning and forming work**

The Cleveland Automatics briefly described at left combine an extremely wide range of multiple-tooled operations with quick set-up and simplified control. Four models in 16 capacities, make it possible for you to select a Cleveland *exactly suited* to your production requirements. Typical work performed by these Clevelands is shown below.

**TYPICAL PARTS PRODUCED BY
MODEL AB, AW or A CLEVELANDS**



**TYPICAL PARTS PRODUCED
BY MODEL B CLEVELAND**



Whichever Cleveland you select, you'll obtain a modern machine tool that will give you fast, accurate, economical production on long or short runs. You'll also be taking advantage of 65 years of experience in precision engineering, plus Cleveland's matchless reputation for reliability and service.

Investigate the many advantages of Cleveland Automatics for your production. Call in a Cleveland sales engineer or let us submit recommendations with production and cost estimates based on part samples or prints of your work. There is no obligation.



For detailed descriptions of these Cleveland Automatics, write for new General Bulletin.

THE CLEVELAND AUTOMATIC MACHINE COMPANY

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

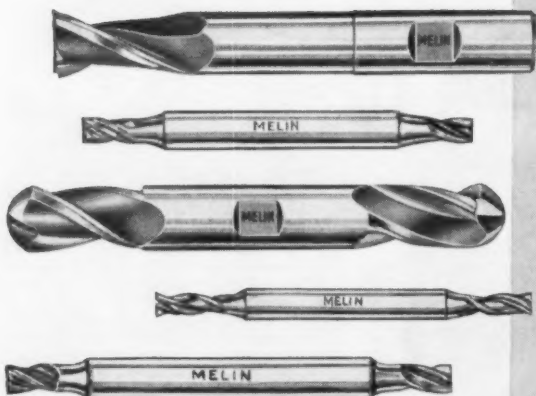
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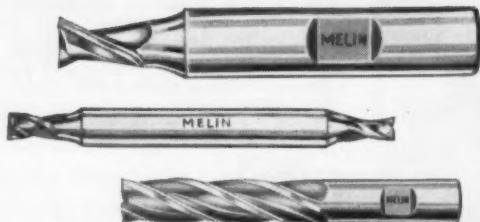
**4940 Beech Street
Cincinnati 12, Ohio**

**SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • S. ORANGE**



MELIN

END MILLS



Representatives in principal cities.



**MELIN TOOL
COMPANY, INC.**

3373 West 140th Street
Cleveland 11, Ohio





There is a difference
in end mills . . .
MELIN end mills!
Proof of this
is evident in the
continued increase
in **MELIN** popularity.
The growth in
MELIN tool acceptance
was by no means an
accident
. . . The secret
is in **CONSISTENT
QUALITY**. This
standard of Quality
assures you better
performance . . .
longer lasting
performance . . .
CONTINUOUSLY . . .
from one shipment to
another.
Next time you order
end mills . . .
specify the finest . . .
specify **MELIN**.

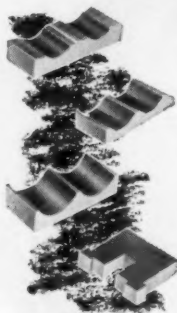
**MANUFACTURED IN
TWO, THREE AND FOUR
FLUTE TYPES.**

For more data circle 205 on Reader Service Card

HOW TO SPECIFY CAST ALLOY FORM TOOLS TO GET BEST RESULTS

<p>RIGHT WAY Dense, hard, cutting edges.</p>  <p>Cast-to-Form—softer center area follows form contour, leaving uniform thickness of hard, dense metal for cutting edges.</p>	<p>Center area of any cast tool is coarser and softer than outside.</p>	<p>WRONG WAY</p>  <p>Ground from standard rectangular or square—the ground contour enters the softer, coarser center of casting, resulting in a short-lived cutting edge.</p>
--	---	---

V-R TANTUNG Cast Alloy Available Preformed to Your Prints



Lasts Longer! By specifying V-R TANTUNG form tools *cast-to-shape*, you get cutting edges having fine grain structure, high hardness and exceptionally long life—the very characteristics for which you specify TANTUNG in the first place! But, as shown above, if you grind standard rectangular or square cutting tools to form, you may destroy these advantages, greatly reducing tool life.

Costs Less! The slightly higher cost of buying your TANTUNG tools cast-to-form is saved many times over by less grinding, faster cutting, longer tool life and reduced down-time for tool changes.

TANTUNG IS NOT HIGH SPEED STEEL
it is an exclusive alloy cast to hardness with no subsequent heat treating!

ASK FOR CATALOG 24-page V-R TANTUNG Catalog gives technical data and lists solid tool bits, tipped tools, cut-off blades and toolholder inserts. Write today or call your V-R Distributor or Representative.



**MANUFACTURERS OF
CEMENTED CARBIDES AND TANTUNG CAST ALLOYS ...
TOOLS ... BLANKS ... TOOLHOLDERS ... INSERTS ... DIES**

V-R and TANTUNG are registered trademarks of Vascoloy-Ramet Corporation

Vascoloy-Ramet Corporation

SUBSIDIARY OF FANSTEL METALLURGICAL CORPORATION

T-565-S

864 Market St. • Waukegan, Illinois

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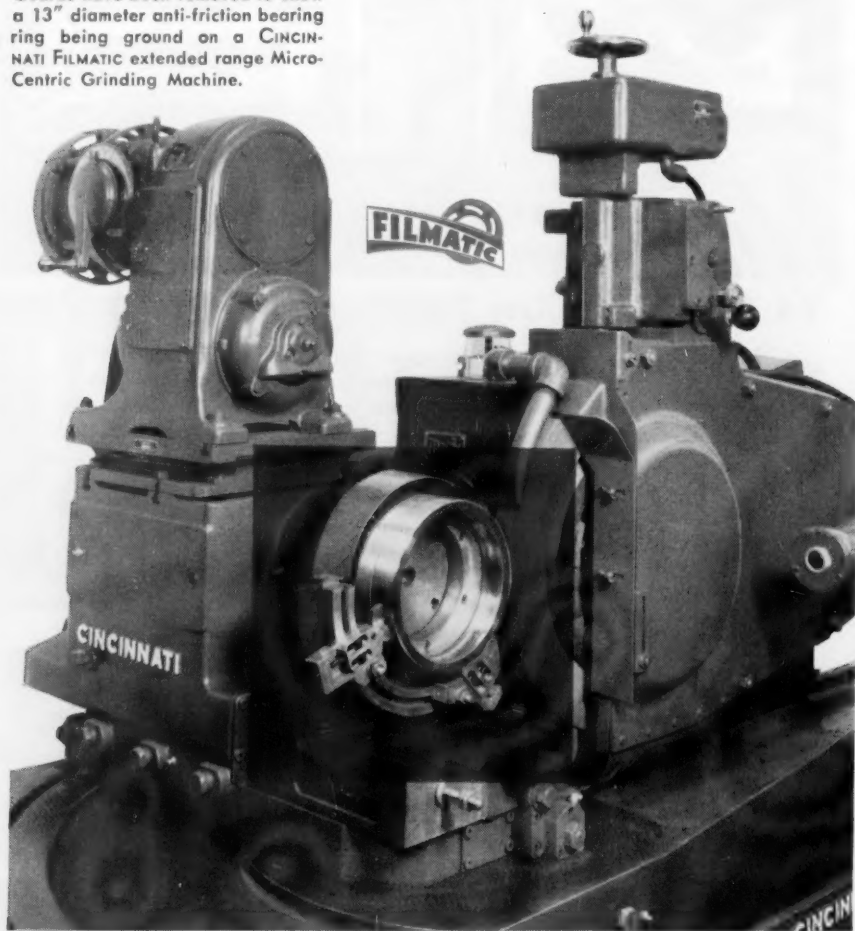
July, 1956

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THIN WALL KING

get a High Quality Micro-

Guards have been removed to show a 13" diameter anti-friction bearing ring being ground on a CINCINNATI FILMATIC extended range Micro-Centric Grinding Machine.



CINCINNATI



SIZE RINGS

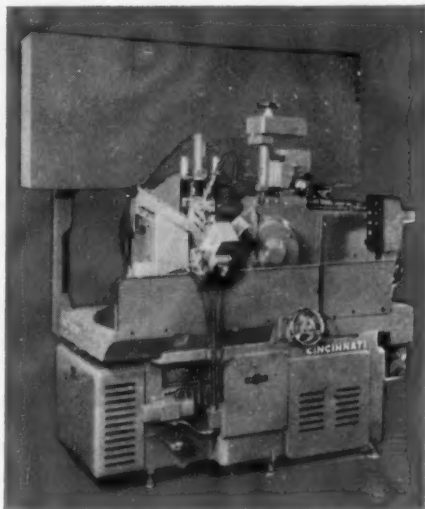
Centric Finish on this Extended Range Machine

Want to improve the quality and reduce the cost of your short cylindrical work? CINCINNATI FILMATIC Micro-Centric Grinders will do the job to your complete satisfaction—.000025" round and .000025" square with one side of the part are routine tolerances. The Micro-Centric method employs two shoes to support the work, and a drive plate to rotate it. Anti-friction bearing races and rings are naturals for the Micro-Centric method of grinding. Sizes of these parts vary from miniature bearings for instruments to the large rings being ground on the extended range Micro-Centric shown here. Perhaps parts for other components, even though squareness of face is not required, could be Micro-Centric ground to far higher standards of quality and at lower costs. It's well worth consideration by your methods engineers. And speaking of methods, these machines may be equipped for:

- Automatic loading
- Automatic wheel truing with counter device
- Automatic size compensation

Does the Micro-Centric method of grinding look interesting for your shop? Our grinding specialists will be glad to help you decide. Write for catalog No. G-662.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO



CINCINNATI FILMATIC Micro-Centric Grinding Machine. Complete information may be obtained by writing for catalog No. G-662.

**CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES**

For more data circle 208 on Reader Service Card

July, 1956

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ANYTHING WE CAN *HELP YOU*
STRAIGHTEN
OUT?

**10, 25,
50 TON
CAPACITY**



**ANDERSON
HYDRAULIC
STRAIGHTENING
PRESS**



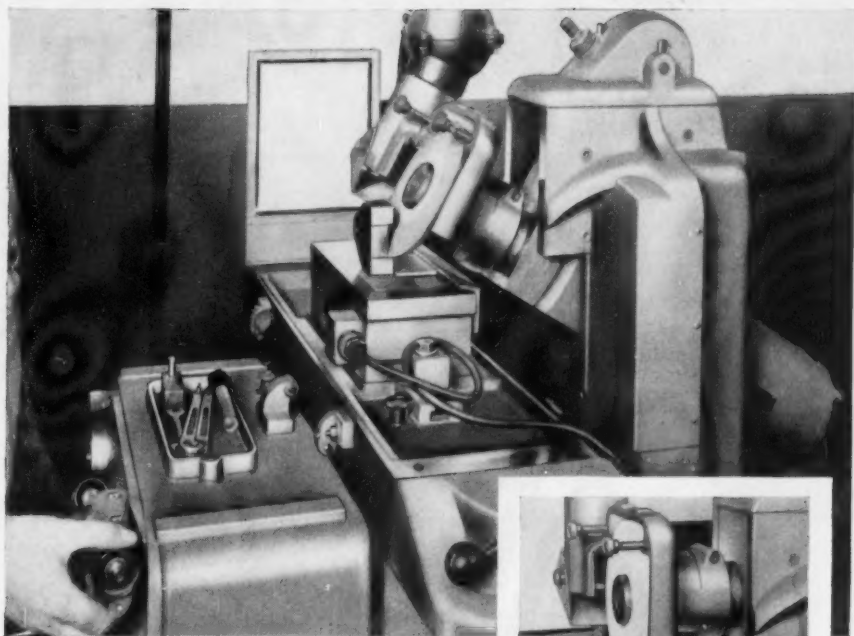
**Write for
Bulletin 7-22**



ANDERSON BROS. MFG. CO.
ROCKFORD, ILLINOIS

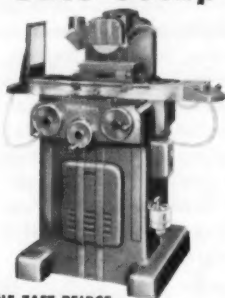
Manufacturers with straightening, checking, and truing operations that require speed and accuracy find Anderson Power Presses to be the answer to their problems. Available with either traveling or stationary ram. Capacities up to 10, 25, and 50 tons. (Press illustrated is of 50 ton capacity.) So accurate a shaft can be straightened to within .001". Flexible, sensitive control valve operated by hand lever. Let us show you how you can profit from low-cost, high-production, precision straightening. Write for Bulletin 7-22.

For more data circle 209 on Reader Service Card



This is the new way — Taft-Peirce angular surface grinding, as compared to conventional side wheel grinding, at right. Workpiece is held on Superpower Electro-magnetic Chuck with fine mesh face plate. (Wheelhead cover removed to demonstrate operation.)

T-P Tilting Wheelhead Cuts Setup and Grinding Time in Half!



**THE TAFT-PEIRCE
NO. 1 PRECISION GRINDER**

Tilting wheelhead is mounted between two pairs of circular dovetail slides, permitting swivelling of the entire spindle about the wheel center — through an arc from horizontal to 30° below center. Spindle can be set to any desired angle to simplify and even eliminate the setups frequently required for difficult grinding operations.

Same workpiece, same operation — but what a difference in time and cost.

Exclusive Taft-Peirce *angular surface grinding* makes it possible to complete a setup and grinding operation in less than half the time required with conventional side wheel grinding. Just set piece on magnetic chuck, dress wheel, and grind! And there's no problem with burrs, working over-size, curved surfacing, or wheel glazing.

All this, plus the extreme accuracy of the No. 1 Precision Surface Grinder. Operators easily grind to .0001", and to .00005", with experience. Surfaces are so smooth they seal without lapping; so accurate, they wring!

See these remarkable features demonstrated — we're sure you'll be convinced of the extra savings this grinder will produce. Contact your local T-P representative or write: Taft-Peirce Manufacturing Co., Woonsocket, R. I.

THE TAFT-PEIRCE FAMILY...

- Magnetic Chucks
- Precision Gages
- Air Gages
- Grinding Machines
- Lapping Machines
- Tool-Room Specialties



TAKE IT TO TAFT-PEIRCE

TAFT-PEIRCE MANUFACTURING COMPANY
WOONSOCKET, RHODE ISLAND

T-P Means
TOP
Precision

For more data circle 210 on Reader Service Card

July, 1956

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This Team Picks "T-P" to Cut Tool Room Costs

Purchasing . . . Production . . . Inspection — each rely on Taft-Peirce Tool Room Specialties to do an important job for their company. Better construction, more attention to details like heat-treating mean much longer life, greater *true value*. T-P precision craftsmanship in grinding, assembly, and inspection assures unfailing accuracy on every set-up . . . a better part, or final product. And basic construction is so sound that many of these products are reground after extensive use for even longer life-value.

Specify these Taft-Peirce Tool Room Specialties

(Top row, left to right) Angle irons, large stocks of several styles and sizes; V-Blocks, cast iron and steel for milling, planing, grinding and inspection; Box Parallels, sides parallel to within .00025" in 6", square to within .0005" in 6", (middle row) Cast iron surface plate with universal square and cylindrical square; Duplex bench block; Sine angle plate; 5" and 10" Sine Blocks. (lower row) Taper test fixture; Granite surface plate with 5" Sine Bar; and Comparator-Square with Cylindrical Squares.

Remember, to get that
extra cost-trimming value . . .



TAKE IT TO TAFT-PEIRCE

THE TAFT-PEIRCE MANUFACTURING CO.
WOONSOCKET, R. I.

T-P Means
TOP
Precision

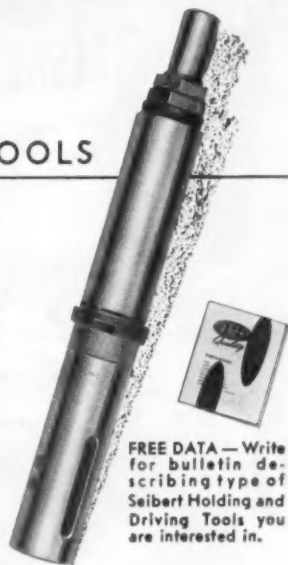
Caterpillar



View of machines at Caterpillar Tractor Co., Peoria, equipped with Seibert Precision-Built Spindles, Adapters, and Holding Tools.

12 Year User OF SEIBERT PRODUCTION TOOLS

● Like any other reputable manufacturer, large or small, we are especially pleased when the products of our labor are accepted for tests and eventually approved for actual service by a manufacturer or machine tool builder. Yet, being realistic, we know full well this is only the beginning. The acid test comes later, proving our ability to maintain high standards of quality and a constant, dependable service day-in and day-out over a period of years. It is therefore, a source of deep gratitude and satisfaction in that we have, over a period of years, been privileged to serve so many fine companies like Caterpillar Tractor Co. who serve others so well.



FREE DATA — Write for bulletin describing type of Seibert Holding and Driving Tools you are interested in.



Upper and Lower Drive Assemblies



Pinion Drive Shafts



Universal Joints



Bracket Spindle Assemblies



Adapters

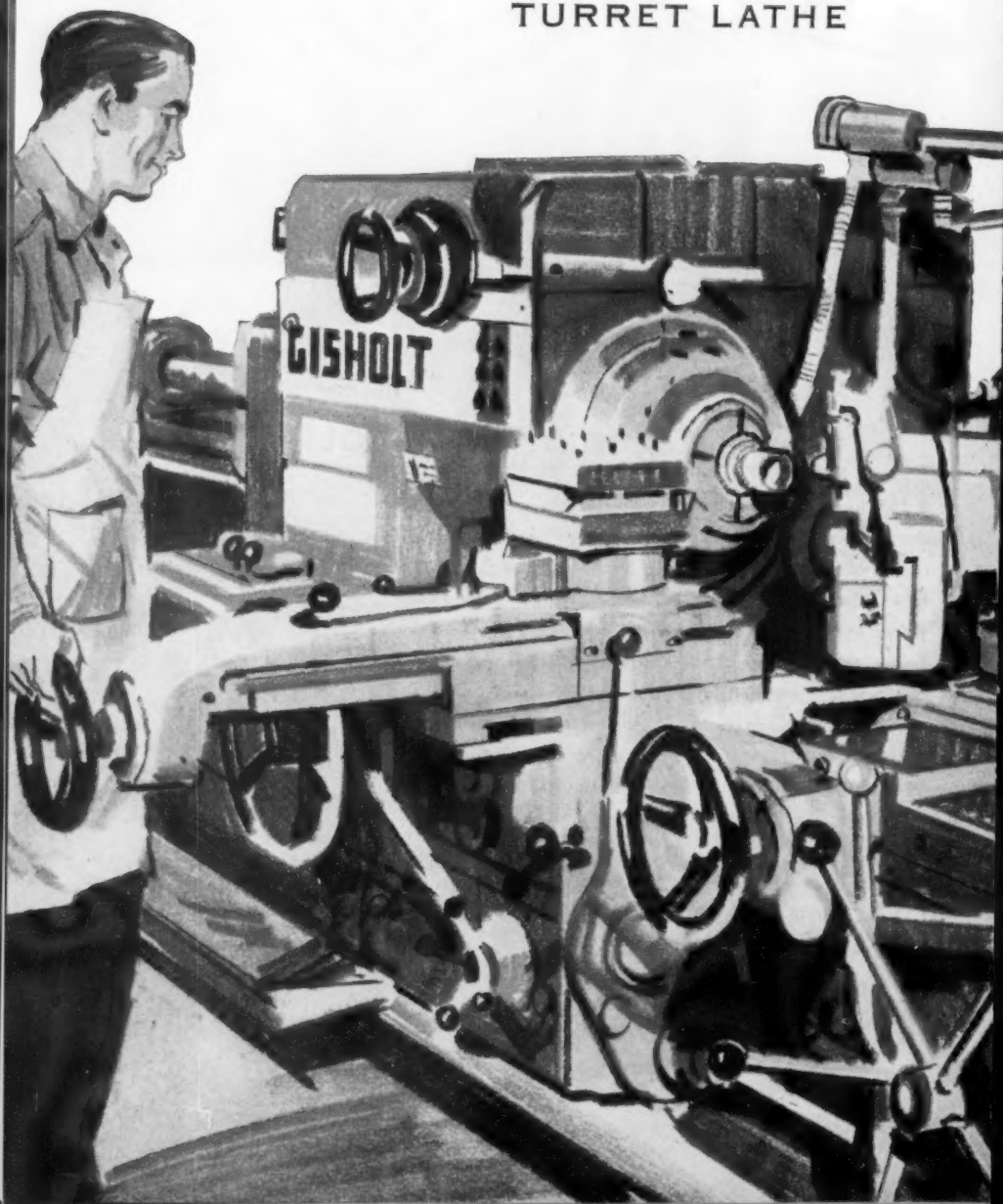


SEIBERT & SONS, INC. CHENOA, ILLINOIS

Quality MULTIPLE DRILL SPINDLES AND PRODUCTION TOOLS

For more data circle 212 on Reader Service Card

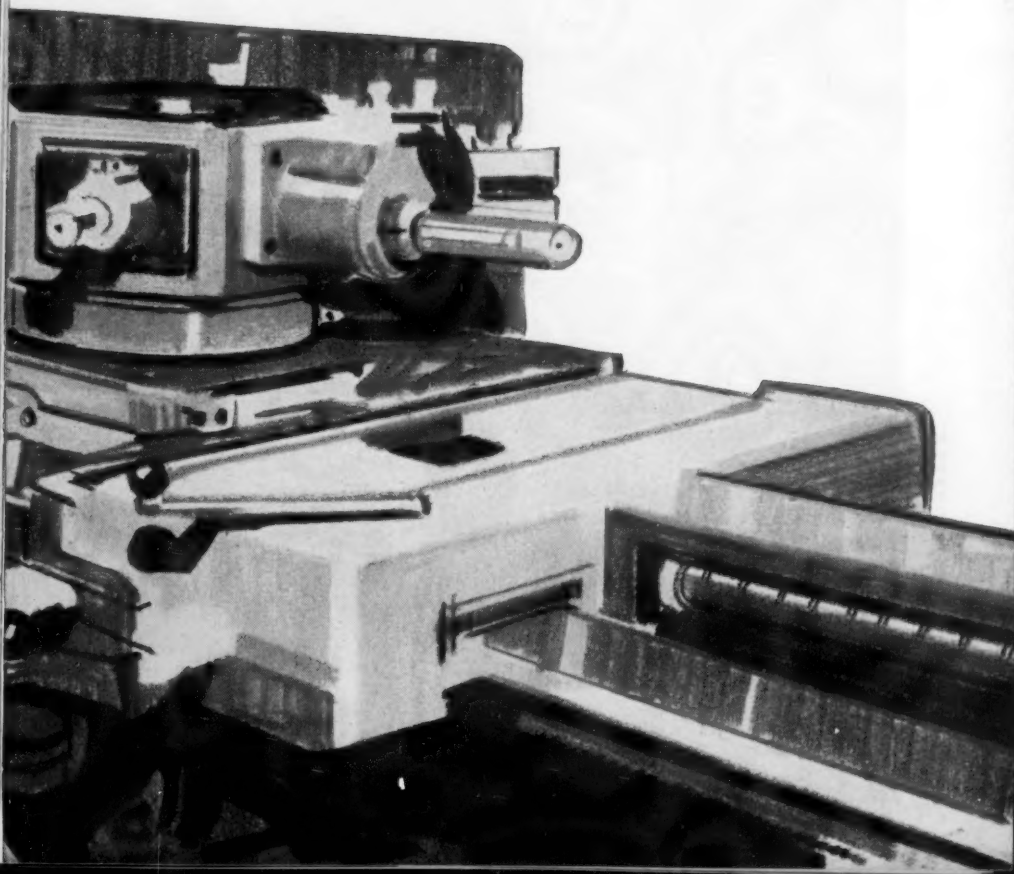
GISHOLT MASTERLINE
SADDLE TYPE
TURRET LATHE





Throughout the metalworking industry, Gisholt High Production Saddle Type Turret Lathes are known for simpler controls, ease of operation, wide adaptability and sturdy construction. Gisholt continues to set the pace with the new MASTERLINE series—outstanding in ability to handle rugged jobs, with ample power and massive weight to withstand deep cuts at punishing feeds without vibration. Let us tell you more about these machines—and how they can be applied profitably to your manufacturing processes.

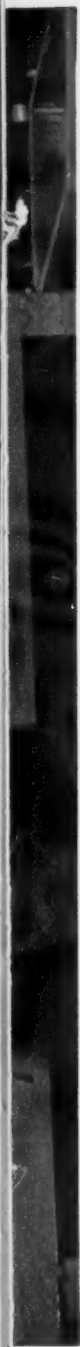
Gisholt Machine Company, Madison 10, Wisconsin
Look ahead—keep ahead—with Gisholt



Made with MAGNESIUM

DOW





A FEW POUNDS make a big difference when jigs have to be moved manually several times an hour.

MAGNESIUM FOR LOW-COST TOOLING

Lightweight magnesium tooling plate costs less to buy, less to fabricate and less to use

- **COSTS LESS TO BUY**—Jigs and fixtures made with magnesium cost you less in every way. Magnesium tooling plate costs less than commonly used lightweight tooling materials.

- **COSTS LESS TO FABRICATE**—Magnesium jigs and fixtures are easy and economical to build, too. The reason is that magnesium tooling plate is easy to machine, easy to weld. It has guaranteed flatness, excellent dimensional stability and freedom from porosity.

- **COSTS LESS TO USE**—Handling costs are also lower when you use magnesium tooling plate. Magnesium weighs one fourth as much as steel and only two thirds the weight of aluminum. By making your jigs and fixtures with lightweight magnesium you'll increase worker efficiency and reduce lost-time injuries.

For more information about magnesium tooling plate contact your nearest supplier of Dow magnesium, or write THE DOW CHEMICAL COMPANY, Midland, Michigan, Dept. MA 371M.

AVAILABLE FROM STOCK AT: Copper and Brass Sales, Inc., Detroit, Mich. • Fullerton Steel and Wire Company, Chicago, Ill. • Hubbell Metals Inc., St. Louis, Mo. • A. R. Purdy Co., Inc., Lyndhurst, N. J. • Reliance Magnesium Company, Los Angeles, Calif. • Vinson Steel and Aluminum Co., Dallas, Texas.

*you can depend on **DOW** MAGNESIUM*



For more data circle 216 on Reader Service Card

Shortest Route to Quality Control is via **PRATT & WHITNEY**



THREAD GAGES



**Cylindrical
GAGES**



**TAPER
GAGES**

ROLL THREAD SNAP GAGES
Adjustable Limit Snap Gages



**Oil Country
GAGES**



**RAILROAD
GAGES**



PRECISION END MEASURES



**Precision
GAGE BLOCKS**

shortest route . . .

because Pratt & Whitney manufactures *complete* lines of conventional hand gages. You can select — from just one source — *all* the types and models you need to establish efficient quality control methods in your plant. Just a few of the many available are shown here.

and surest route . . .

because into every Pratt & Whitney Gage is built an unmatched quality and accuracy that insures higher standards of precision maintained with complete dependability.

FOR COMPLETE INFORMATION . . .

write for free descriptive literature on the P&W Gage types you're interested in . . . or call in the P&W Gage Specialist to help you select the best gage for your specific requirements.



PRATT & WHITNEY COMPANY INCORPORATED

25 Charter Oak Boulevard, West Hartford 1, Connecticut
Branch Offices and Stocks in Principal Cities

MACHINE TOOLS • GAGES • CUTTING TOOLS

For more data circle 217 on Reader Service Card

SENSITIVE FOR SMALL HOLE DRILLING, RIGID FOR FULL CAPACITY JOBS

"BUFFALO" No. 15 drills give you all the features you need for peak production at the lowest possible cost. This includes:

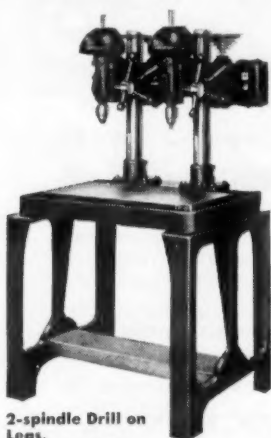
EASE OF HANDLING: (1) Handy 3-spoke feed and free-sliding spindle; (2) five quick-change speeds; (3) easy vertical adjustments of drillhead or table.

STRENGTH: overall rigid, heavy-duty construction including $2\frac{3}{4}$ " steel column.

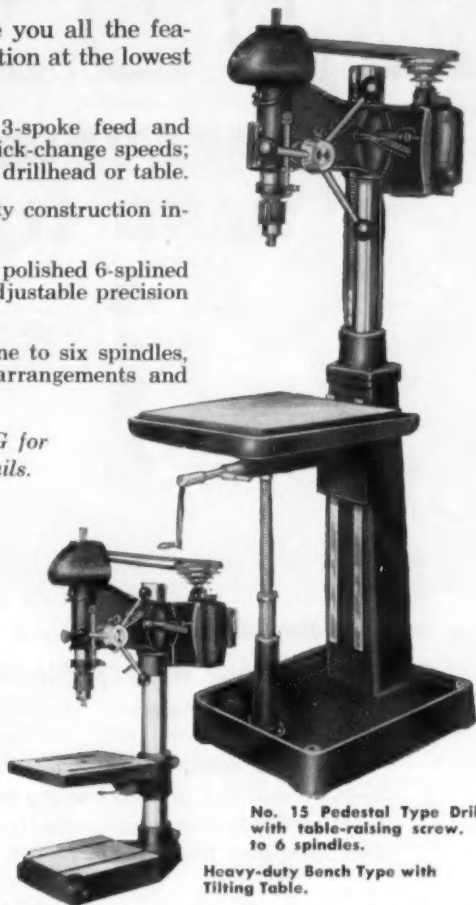
ACCURACY: accurately ground and polished 6-splined alloy steel spindle turning on adjustable precision ball bearings without end play.

COMPLETE SELECTION: 15 models, one to six spindles, bench or floor types, special arrangements and attachments available.

WRITE FOR BULLETIN 2963G for all "Q" Factor* construction details.



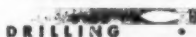
2-spindle Drill on Legs.



No. 15 Pedestal Type Drill with table-raising screw. 1 to 6 spindles.

Heavy-duty Bench Type with Tilting Table.

* The "Q" Factor—the built-in Quality which provides trouble-free satisfaction and long life.



BUFFALO FORGE COMPANY

MACHINE TOOL DIVISION

388 Broadway

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

PUNCHING

SHEARING

BENDING

For more data circle 218 on Reader Service Card

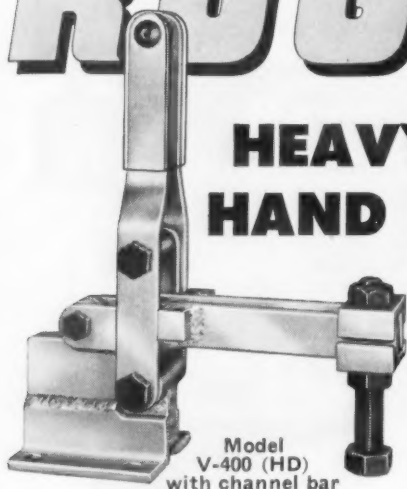
Buffalo, N. Y.

July, 1956

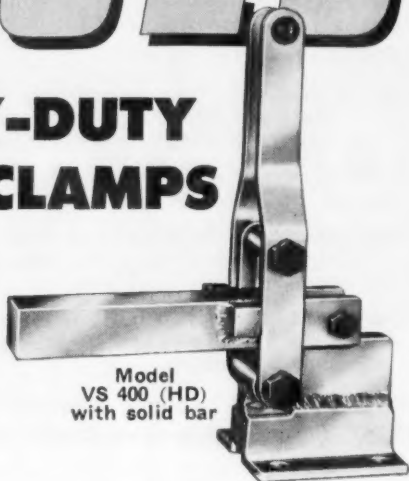
modern machine shop 19

RUGGED

HEAVY-DUTY HAND CLAMPS



Model
V-400 (HD)
with channel bar



Model
VS 400 (HD)
with solid bar

Knu-Visc offers rugged heavy-duty clamps, with solid bar or channel bar, and either hand or air operated, for all kinds of tough holding jobs.

In addition to their stand-up stamina for rough going, these Knu-Visc Clamps feature:

- 1—Easy and complete replaceability of parts
- 2—Hardened and ground bearing bolts
- 3—Minute adjustment of parts through self-locking nuts
- 4—Toggle Bars from C.R.S. Bars

Developments like these are typical of Lapeer engineering. More information? Write for catalog today on the models available.

Manufacturers of over 150 models of manually and air-operated clamps and pliers

**KNU-VISE
PRODUCTS**

LAPEER MANUFACTURING CO.

3048 DAVISON ROAD

LAPEER, MICHIGAN

WESTERN DIVISION: 422 Magnolia, Glendale, California • CANADIAN DIVISION: Higginson Engr., Hamilton, Ontario

For more data circle 219 on Reader Service Card

20 modern machine shop

July, 1956

Ellstrom CHROMIUM PLATED Standards

"Measuring in Millionths for Three Generations"



Now! Closer gage block tolerances give you up to 75% longer wear life at no increase in price!

Ellstrom Standards are now produced and unconditionally guaranteed to specified millionths well within the following improved gage block tolerances:

"W" Working Accuracy Blocks: $\pm .000008$ ", $-.000002$ " per inch of length, with flatness and parallelism held within $.000006$ ".

"I" Inspection Accuracy Blocks: $\pm .000004$ ", $-.000002$ " per inch of length, with flatness and parallelism held within $.000004$ ".

In addition to providing finer accuracy at no increase in price, these Ellstrom Standards also give you up to 75% longer wear life. For, by reducing the allowable "minus" deviation, you get an additional guaranteed wear allowance of from 2 to 6 millionths of an inch, as compared to

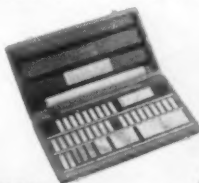
common industry standards, before the blocks need be considered worn undersize.

Ellstrom Standards are furnished in 28 basic sets of from 8 to 92 blocks in both rectangular and square styles. Individual blocks are also available in sizes ranging from $.010$ " to and including 20.000 " to meet your particular needs. Send for complete specifications and prices today!

Set No. 35-R: "W"—\$195.80; "I"—\$280.50

Set No. 81-SA:

"W"—\$545.60; "I"—\$764.35



ELLSTROM STANDARDS DIVISION
DEARBORN GAGE COMPANY

"Measuring in Millionths for Three Generations"

22038 Beech Street • Dearborn, Michigan

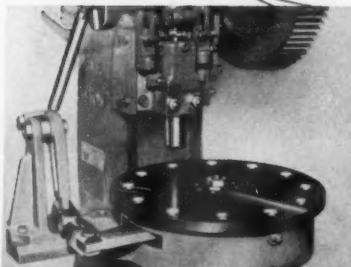
REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE UNITED STATES AND CANADA

*How to
CUT
Labor Costs!*

Automate YOUR PRESENT benchmasters

AND OTHER PRESSES!

With these additional Benchmaster products you can easily convert your present production lines to full or semi-automation at minimum cost!



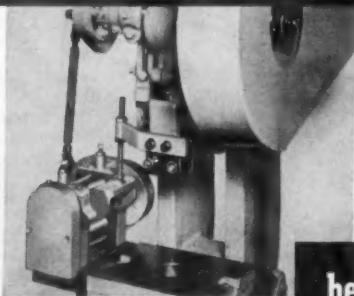
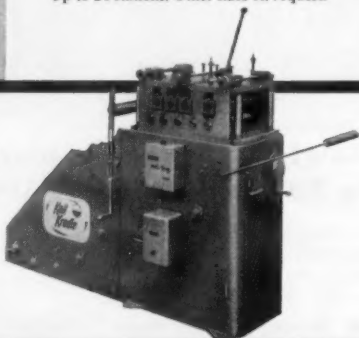
benchmaster AUTOMATIC DIAL INDEX FEEDS

Converts punch presses or drill presses to high speed automatic operation. Avoids expensive investment in single-application machines. Excellent for marking, assembling, reaming, trimming, crimping, etc. Up to 6000 strokes per hour! Easy 4 bolt mounting. 12", 15" table diameters. Up to 24 stations. Other sizes on request.

benchmaster KOIL KRADLE-STRAIGHTENER

COMBINATIONS (Available singly or in combination)

Automatically feeds and straightens coil stock—even in foil thicknesses supplying any machine from a slack loop. Equipped with variable speed drive. Quick disengage lever releases top rollers... instantly shuts off entire unit. Many width and thickness capacities. Ask for recommendations.



benchmaster AUTOMATIC FRICTION ROLL FEEDS

—The one roll feed that can't be beat for performance at low cost. Feeds cloth, cork, paper, metal, etc. Fits new or old Benchmasters and other presses. Height adjustment levels rollers with die. Roll lifters automatically release grip after each stroke for accurate positioning. Ground, knurled or rubber covered rolls in 3, 5, 7 and 9" widths. Strokes: 0 to 3" cut-off and 0 to 6" cut-off

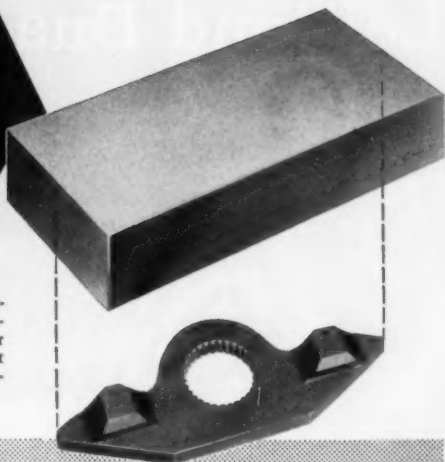
benchmaster

World's largest
manufacturer of small punch
presses and mills.

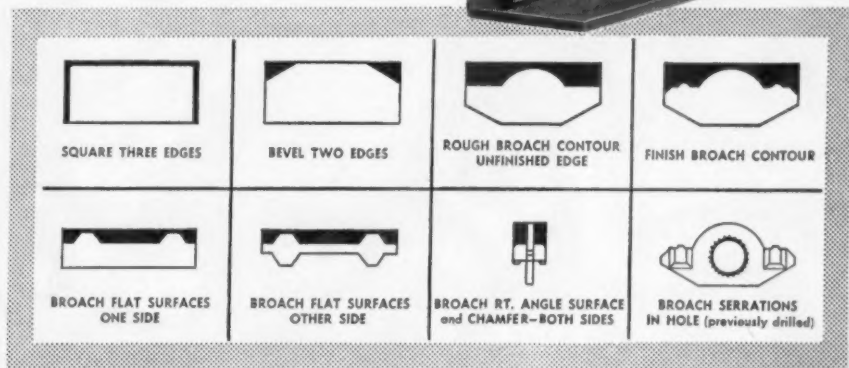
1835 W. Rosecrans Avenue, Gardena, California

For more data circle 221 on Reader Service Card

ROCKER ARM
machined from bar stock
in **8**
BROACHING OPERATIONS



Broaching's all-round versatility is illustrated by this unusual adaptation of a standard American 3-Way broaching machine for the production of finished rocker arm part from bar stock. The eight broaching operations are shown in sequence below.



Small quantity production of this rocker arm part, plus a requirement that all surfaces be finished, made a forging impractical. Broaching gave the desired finish and confined the operations to one machine so that holding and locating fixtures were simplified.

American designed and built the broaches and had previously supplied the 3-Way vertical hydraulic broaching machine. But to American's good customer, The American Tool Co.,

Kalamazoo, Michigan goes the credit for the ingenuity displayed in developing the operation and building the interchangeable fixtures.

Whether you require eight operations on few parts, or one operation on thousands, the versatility of American broaches, fixtures and broaching machines can mean gains in your output, cuts in your costs. Give American the details; you'll receive a prompt recommendation.

ASK FOR CATALOG 450



American BROACH & MACHINE CO.
A DIVISION OF SUNSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

See *American* First — for the Best in Broaching Tools, Broaching Machines, Special Machinery

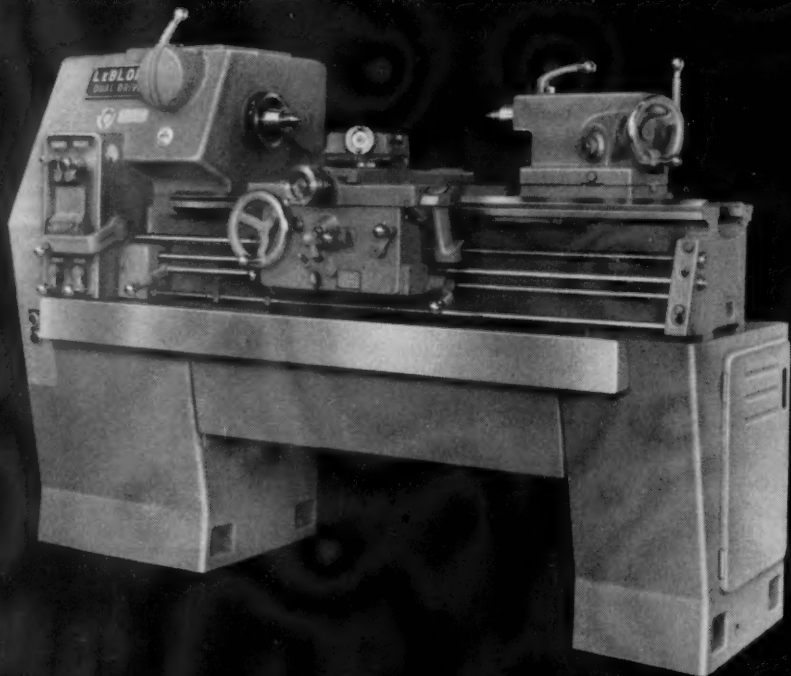
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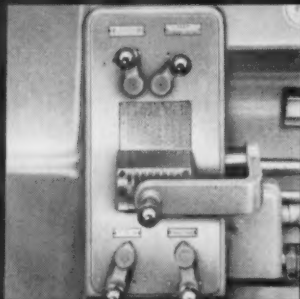
July, 1956

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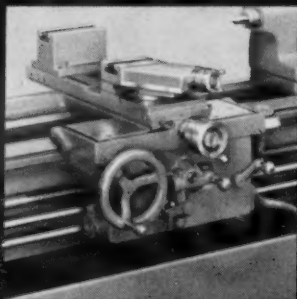
a LeBlond Dual Drive costs



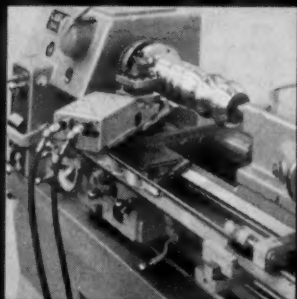
gives you more than higher priced lathes



Totally-enclosed quick change box is automatically lubricated, provides 48 feed and thread changes.



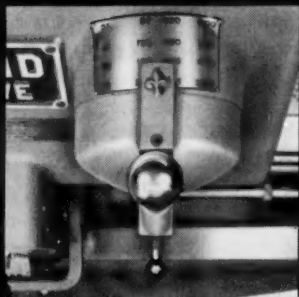
Rugged apron and carriage gives long-lived precision. Shown with compound and plain connected rest.



Hydra-Trace[®] makes the Dual Drive the least expensive tracing engine lathe of comparable quality.

only \$4625*

* Base price, 30" center distance with standard equipment, not including motor or control.



Single lever selects sixteen speeds from 31 to 2400 rpm in both gear and non-slip belt ranges.

More useful power, more swing capacity—

plus all the precision, convenience and long life that LeBlond knows best how to put into a lathe! Briefly, this is why the Dual Drive is considered the best buy for medium duty turning by companies who want the most productive capacity per dollar invested.

Virtually all of the 5 hp is available for cutting due to headstock design which uses both gear and non-slip belt ranges. Sixteen speeds from 31 to 2400 rpm are chosen by a single lever.

Swing over bed and carriage wings is 15", over compound, 9½". A single lever controls both cross and length feed. Quick change box is totally-enclosed, provides 48 feed and thread changes. Tailstock is of the thrust-lock design. Hardened and ground steel ways are arranged according to the compensating principle which distributes cutting forces for maximum life and precision.

For specialized turning, a variety of attachments are available. The addition of Hydra-Trace,* for example, makes Dual Drive the least expensive tracing lathe you can buy of comparable capacity and quality.

Whatever your turning needs, there's a lathe in LeBlond's complete line to do the job. 76 different models to choose from. Call your LeBlond Distributor or write for complete information about the Dual Drive, Bulletin 6E.

*Hydra-Trace (Trade Mark registered U. S. Pat. Off.) is LeBlond's heavy-duty hydraulic tracing attachment. Can be mounted in place of compound rest on practically all LeBlond lathes built since 1935.

... cut with confidence



THE R. K. LEBLOND MACHINE TOOL COMPANY
CINCINNATI 8, OHIO

*World's largest builder of a complete line of lathes
for more than 69 years*

Never Confuse the No. 8 MARVEL with an ordinary Band Saw ...only the MARVEL is Universal



Only on a No. 8 MARVEL can the saw column be instantly indexed and locked at any angle from 45° right to 45° left, and the saw then fed thru the work at the desired angle — without moving the work.



Only a No. 8 MARVEL can do all of these things: Snip-off a 1/4" rod or cut-off an 18" x 18" cross section.



Rough to Size and Shape



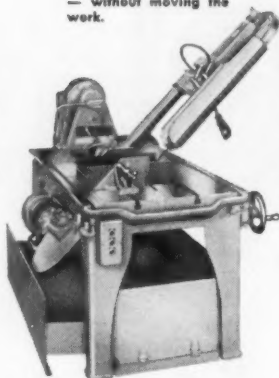
Miter



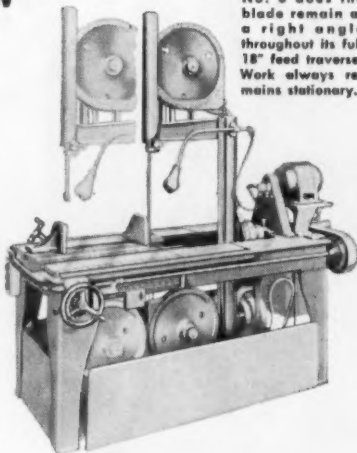
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cut off and shape
Structural Beams



Only on a MARVEL No. 8 does the blade remain at a right angle throughout its full 18" feed traverse. Work always remains stationary.



Only a No. 8 MARVEL has the large T-slotted work table, with removable quick action vise, that permits accurate set-ups of work of unrestricted sizes and shapes, special fixtures; Etc.

"Rough Machine" to size and shape with minimum chip waste

The No. 8 MARVEL is the "busiest tool in the shop" wherever installed because it is a *universal* tool—has both the capacity and the versatility to handle not only standard sawing jobs but innumerable "trick" and convenience jobs as well. More than a metal saw, the No. 8 MARVEL is a fine machine tool with machine tool features like: Both power and hand feeds; Depth Stops; Automatic Blade Tension; Built-in Coolant Pump; Three operating speeds (or six with 2-speed motor). Moisture-proof electrical controls that conform to both "J.I.C." and "MACHINE TOOL" electrical standards; Dirt-proof ball bearings, etc.

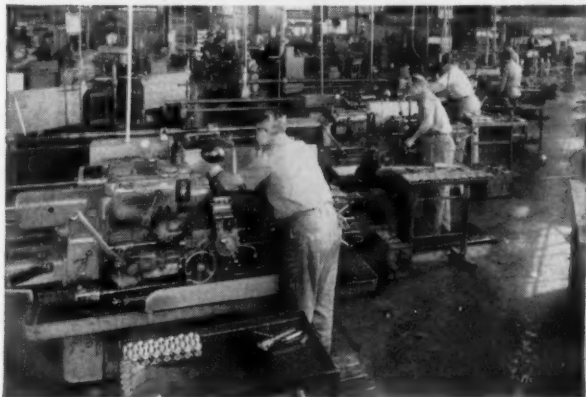
If you cut, machine or fabricate metal, this is a sawing machine you should know about. Write for catalog.

MARVEL *Metal Cutting*
SAWS
Better Machines—Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.
For more data circle 225 on Reader Service Card

Here's a real case of SMALL LOT PRODUCTION

on No. 3 turret lathes at CAMCO, Inc.



CAMCO MACHINES
A WIDE VARIETY OF
PARTS LIKE THESE IN
6 TO 100 PIECE LOTS

CAMCO, INC., Houston, Texas, depends on Warner & Swaseys for small lot production of parts for their gas lift valves—equipment which lifts petroleum from oil wells whose natural forces are exhausted.

Two of these nine Warner & Swaseys are standard tooled No. 3 turret lathes which machine a wide variety of simple to complex parts from stainless steel and monel metal, in lots averaging 50 pieces. Tolerances as low as .002 are held on most jobs.

One of the No. 3's is also equipped with a full length lead screw and selective gear box to machine numerous small lot threading jobs. The threads are chased with the lead screw and an automatic knock-off attachment.

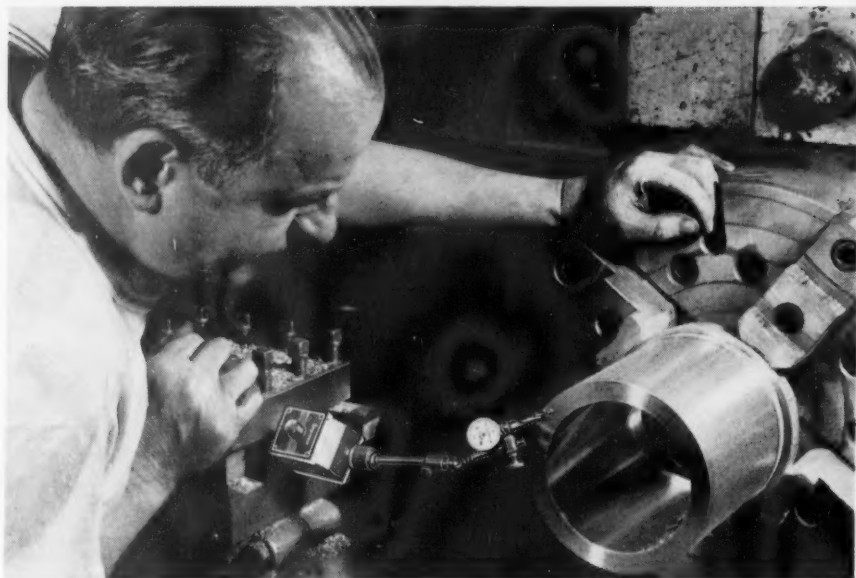
Since the day the first No. 3 machine was installed in 1954, working two 9-hour shifts per day, not one hour has been lost because of downtime for repairs! Similar performance has been achieved by their other Warner & Swaseys—No. 4 and No. 5 turret lathes, 2-A and 4-A heavy duty turret lathes, and two 5-spindle automatics.

For dependable day-after-day production of small lots, you can't beat the versatility and accuracy of standard tooled Warner & Swasey Machine Tools!

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS...WITH A WARNER & SWASEY

For more data circle 226 on Reader Service Card





here's one way STARRETT helps you...

By constantly bringing out new and better precision measuring tools, Starrett helps you produce precision work faster and at less cost.

This new magnetic base indicator holder is an example. It's quick and easy to set up and adjust. It has an on-off push button which permits mounting the base with one hand, leaving the other free to position the indicator. It has universal adjustments in-

cluding a fine adjusting screw for accurate final adjustments.

You expect *and* get an extra measure of value and performance when you specify Starrett precision measuring tools and instruments. Get the same full measure of quality by specifying Starrett when you buy dial indicators, steel tapes, hacksaws, hole saws, band saws, band knives, and precision ground die and flat stock.

All of these precision-made Starrett products are available through one convenient source of supply — your local Industrial Supply Distributor.

NEW CATALOG NO. 27

Shows the complete Starrett line. Ask your Industrial Supply Distributor or write for free copy. Address Dept. MD, The L. S. Starrett Company, Athol, Mass., U. S. A.

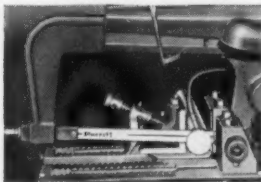


SINCE 1880
WORLD'S GREATEST TOOLMAKERS

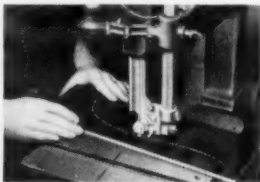
here are many more...



New No. 167 Radius Gages — made of rust-proof stainless steel with Satin Finish.



New Production-Proved Hacksaws are color-identified for job-match selection.



Precision ground Flat Stock and Die Stock now available in over 1000 sizes.

For more data circle 227 on Reader Service Card

New ENGELBERG

MULTIPLE-HEAD, CONVEYOR TYPE

ABRASIVE

BELT GRINDER

GRINDS AND POLISHES UP TO

100% FASTER

(or more!)

Here is a high-production, semi-automatic abrasive belt machine for precision finishing of any flat and many irregularly shaped surfaces. Works on *any* ferrous, non-ferrous, plastic or other material.

Operating wet or dry, the Model 680 increases production up to 100% and more, over conventional grinders. You may simplify fixtures—or eliminate them entirely. Set-up time is reduced substantially: a big saving where short runs are common.

Multiple heads allow you to combine operations which would otherwise be done on several machines or through repeated set-ups of one machine. Single, double or any number of heads are available, powered by 5 or 7½ hp drive—with or without magnetic chuck.

THE ENGELBERG HULLER CO., INC.



**MODEL
680**

SEND US a sample piece or print for cost-and-time-savings estimate. Or ask to have one of our production engineers call to discuss your grinding problems. No charge—no obligation.

.....
• The Engelberg Huller Co., Inc.
• 107 Seneca St., Syracuse, N. Y.
•

Please send complete information on new Model 680 Multiple-Head, Conveyor-Type Abrasive-Belt Grinder, and name of nearest distributor.

• NAME _____

• FIRM _____

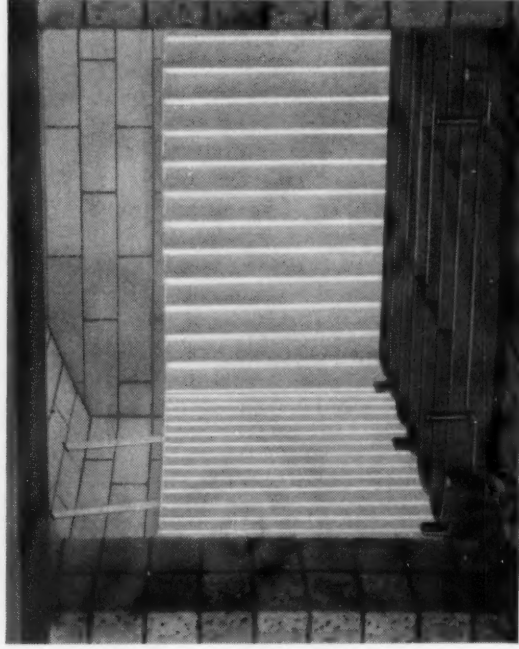
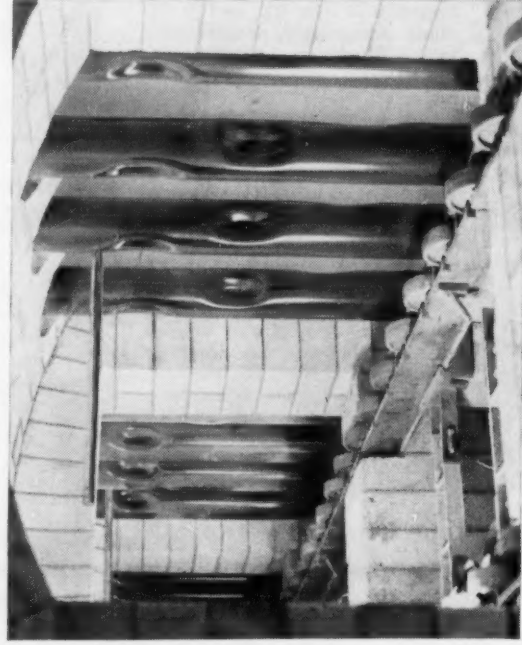
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Whatever your source of heat...

LINDBERG HEAT TREATING FURNACES OFFER THESE EXCLUSIVE ADVANTAGES



... IN THE GAS-FIRED FURNACE

NEW LINDBERG VERTICAL RADIANT TUBE

Because of its revolutionary design, this tube provides a new level of gas-fired furnace performance. The secret lies in the new Lindberg tube's "dimples." The tube carries a central stream of mixed air-and-gas surrounded by a cylindrical stream of air alone. Combustion occurs in the area between these two streams. The "dimples" create eddies accelerating combustion and maintaining even temperatures along the entire tube.

This Lindberg tube will operate at maximum efficiency for a longer period of time. The special protective coating gives greatest possible resistance to carbon penetration. Vertical position eliminates soot deposit and resultant temperature increases at points of sooting.

Tubes are 59 inches long, weigh only 29 pounds, changeable in a few minutes. No costly furnace shutdowns nor high labor and material cost for tube changes.

Lindberg Field representatives in 21 cities are ready to show you how Lindberg furnaces with these revolutionary new elements can improve your heat treating process. You'll find your Lindberg representative's name in the classified section of the phone book or write us direct.



LINDBERG FURNACES

... IN THE ELECTRIC FURNACE

NEW LINDBERG CORRATHERM ELEMENT

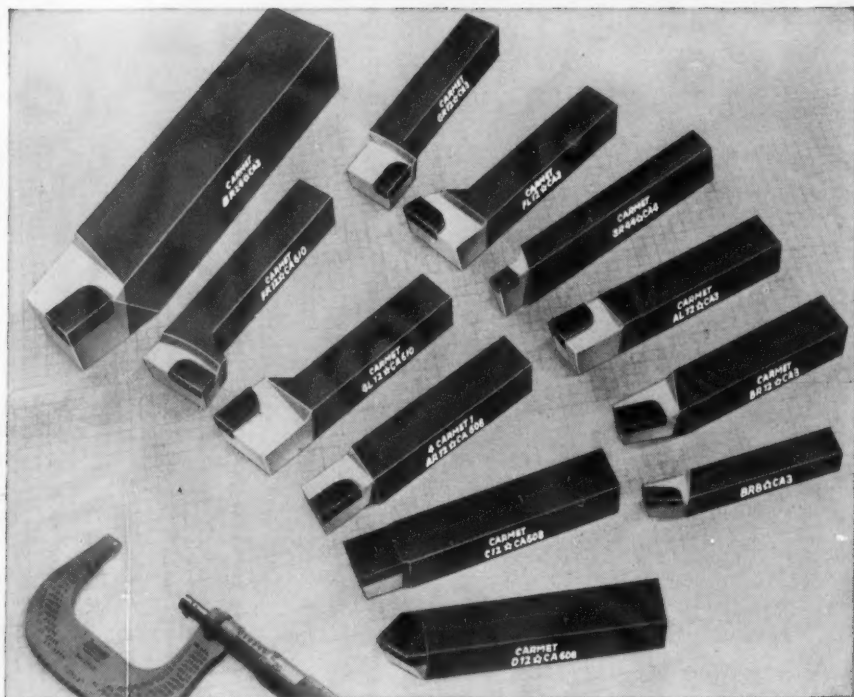
CORRATHERM, Lindberg's radically advanced new electric heating element offers advantages never before available for heat treating furnaces. With this new element carburizing and carbonitriding with electricity becomes practical, efficient and economical. Ideal, too, in other types of Lindberg electric furnaces.

The outstanding feature of the CORRATHERM element is the extremely low voltage at which it operates. Consequently, leakage through carbon saturation and shock or short hazards are eliminated. Elements also act as baffles to direct circulation of convection streams.

CORRATHERM elements are practically indestructible. Work load or operator's charging tool can't hurt them. Watts density is at all time low. Easily installed or replaced, too, as element merely hangs in furnace and no complicated mountings are required.

LINDBERG ENGINEERING COMPANY

2469 W. Hubbard Street • Chicago 12, Illinois



Handle any Cutting Job ••• Cut your Cutting Costs—with

CARMET®

WHAT OTHER JOBS HAVE YOU FOR CARMET TO DO?

We specialize in precision preforming of Carmet carbide metals to any shape for special wear-resistance needs, such as dies, gage blanks, etc. Let us quote on your requirements.

WRITE FOR YOUR COPIES OF THESE HELPFUL BOOKLETS

CARMET CATALOG

36 pages; grades, tool styles, sizes, etc.

METHODS MANUAL

20 pages on speeds, feeds, cuts, etc.

ADDRESS DEPT. MS-79

The Allegheny Ludlum line of Carmet Carbide Tools is *complete*—every style, size and grade you may need for any cutting job in the shop. If you make your own tools, a full line of blanks is available, too—as well as all necessary grades of AL Tool Steels for back-up materials. Extensive stocks of Carmet standard tools and blanks are carried in Distributors' warehouses coast to coast, and special tools are available to order. • Just remember, for best performance on any application, *use Carmet! Allegheny Ludlum Steel Corporation, Carmet Division, Wanda and Jarvis Aves., Detroit 20, Michigan.*

For ALL your CARBIDE needs, call
Allegheny Ludlum



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READER SERVICE CARD

July 1956 Issue

GOOD UNTIL SEPTEMBER 1, 1956

Your Name _____

Your Title_____

Company Name_____

modern

Company Address _____

machine

City-

Zone _____ State _____

days

Products Manufactured

Number of Plant Employees

431 Main Street

Circle KEY numbers (NOT PAGE NUMBERS) for more information on items described or advertised in this issue.

Cincinnati 2, Ohio

[illegible]

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PERMIT No. 7414
NEW YORK, N. Y.

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No Postage Stamp Necessary If Mailed in the United States

4C POSTAGE WILL BE PAID BY—

**modern
machine
shop**

**BOX 74
VILLAGE STATION
NEW YORK 14, NEW YORK**



NOW BETTER GROUND FINISHES!

with J&S guaranteed self-adjusting
live centers*



ACCURACY .0001"

OR LESS

**FOR LATHES, GRINDERS
PERFECTION LIVE CENTERS**

SPINDLE TYPE

***GUARANTEED 2000 HOURS OR 1 YEAR**

SIMPLE DESIGN:

Only six parts. One-piece main body serves as cup for roller bearing on which spindle turns. Allows much greater capacity bearing in same size body.

AUTOMATICALLY ADJUSTS FOR WEAR:

End thrust from work keeps tapered roller bearing perfectly seated—bearing cone and inner race of ball bearing are pressed on spindle; outer race is a light press fit into main body.

ABSOLUTE CONCENTRICITY AND ALIGNMENT FOR BEARINGS:

Both conical and cylindrical bores of body are ground at same setting in work head. Point is ground under load in its own bearings to insure running dead true.

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2 to 7	6 to 20	7 to 18	10 to 24	.8125 1.3350 1.7500

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NOW...

PUSH BUTTON RADIAL DRILL OPERATION

with the *All-New Morris*

Hydra-Power RADIAL DRILLS

Push buttons replace conventional levers and controls to make operation of these new 13" and 15" MORRIS Hydra-Power Radial Drills the easiest and fastest ever offered!

Pushing a button raises or lowers the arm; traverses the head left or right; clamps or unclamps the arm, head or column . . . even shifts the gears in these rugged new radials!

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- All buttons in single panel
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- Pre-selection of spindle speeds and feeds
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Other important Morris Hydra-Power features:

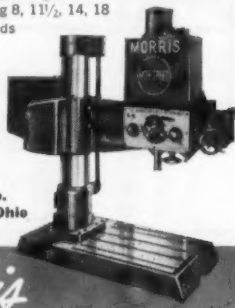
- Automatic tool ejector
- Built-in electric light
- Adjustable spindle counterbalance
- 36 Spindle speeds; 4 ranges
- 18 Feeds, including 8, 11½, 14, 18 and 27 thread feeds

Write for complete detailed information and prices!

The Morris Machine Tool Co.
934 Harriet St., Cincinnati 13, Ohio



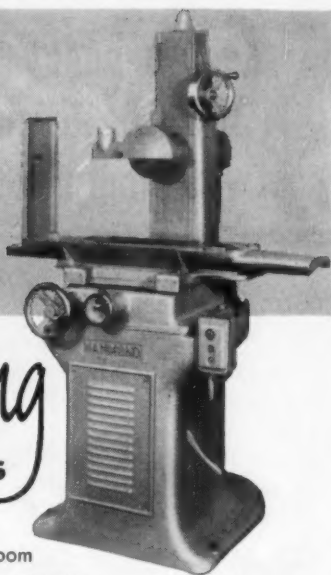
Morris



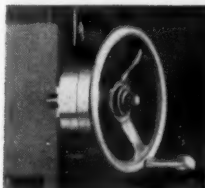
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FOOTBURT

Accurate grinding for small parts



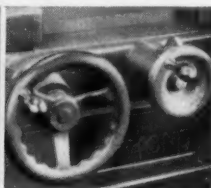
■ The Hammond No. 2, 6" x 18", Surface Grinder is a precision tool room machine for use on the most accurate gauge and tool work. The standard spindle is direct motor driven and is mounted on precision preloaded ball bearing. Total vertical adjustment is 10 3/4". In and out movement of table is 6 1/2" with a longitudinal travel of 18".



ACCURATE SPINDLE ADJUSTMENT—Standard vertical adjustment of spindle through hand-wheel is .0005". With Vernier attachment, spindle can be raised accurately to .00005".



SOLIDLY SUPPORTED SPINDLE CARRIER—Spindle carrier is moved vertically on double dovetail ways with adjustable tapered gibs.



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FOOTBURT

SURFACE GRINDING

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July, 1956

modern machine shop 35

Keep a handy
NORBIDE® Stick
in your tool box...



To form, dress or touch up wheels *in a jiffy*

GET one of these light, easy-to-grip, dressing sticks from your local NORTON distributor and keep it handy in your tool box. You'll find it's just what the doctor ordered for cleaning up a wheel face, forming a radius or touching up a tool wheel in a jiffy.

With a NORBIDE Dressing Stick you can see more of the wheel face and avoid costly overdressing. And it will greatly reduce dust nuisance too.

Better yet, a NORBIDE Stick of Boron Carbide — the hardest man-made material commercially available — will outlast hundreds of ordinary sticks. Order one today or write for Form 1567 giving more details.

NORTON COMPANY, 49 New Bond St., Worcester 6, Mass.



*Next to the diamond in hardness . . .
available at a fraction of diamond cost*

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WITH**

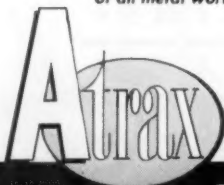


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STANDARDS!

All of the standards in the Atrax line were once "specials"—engineered and built to meet specific production demands. When the Atrax requirements of performance and dependability were proved, these tools were stocked as standards at standard prices—and are now available without delay, to meet virtually all metalworking needs. Whenever you're faced with a tough job, consult the Atrax catalog listing over 1000 standard tools before you order a "special". A production-proved tool to do the job—and do it right—is undoubtedly in stock. Always Specify Atrax, you can't get a better tool—you can't get better performance.

*Eliminate the cost and delay of
"specials"—send today for the
Atrax catalog illustrating more than
1000 solid carbide tools to do 99%
of all metal working jobs!*



THE ATRAX COMPANY

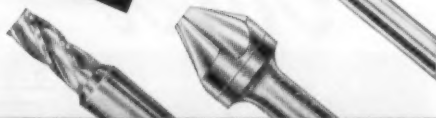
Newington 11, Conn.

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July, 1956

modern machine shop 37

*Atrax stock tools
eliminate the waste & worry
of "specials" 99 times
out of 100!*

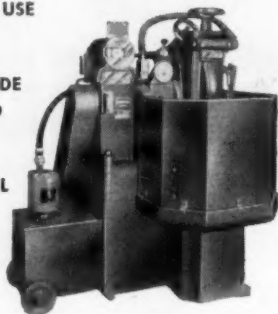


ELIMINATE Costly "Guess Work"

WITH THE

Oliver **TEMPLATE** TOOL BIT GRINDER

- POSITIVE DUPLICATION ASSURED BY USE OF A MASTER TEMPLATE.
- GRINDING ON SINGLE POINT CARBIDE TOOLS REQUIRES SECONDS INSTEAD OF MANY MINUTES.
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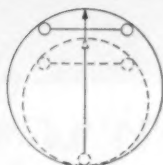
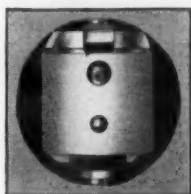


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FACE MILL GRINDERS • AUTOMATIC DRILL GRINDERS • DIE MAKING MACHINES
TOOL & CUTTER GRINDERS • DRILL POINT THINNERS • TEMPLATE TOOL GRINDERS

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This is IT



Centralizer places contacts on true diameter of hole.

Model 1250P-Series



The New DIAL INDICATOR BORE GAGE

FOOLPROOF CENTRALIZATION

- Meets the great majority of all hole inspection needs.
- Longer gaging range.
- Four gages inspect all diameters from $\frac{1}{2}$ " to 8".
- Accuracy protected from handling temperature.

These new Gages definitely meet the accuracy requirements of nearly all hole diameter inspections . . . and at a cost considerably less than that of more elaborate gaging equipment.

They are designed to give accurate centralization for setup with gage blocks, micrometers, master rings, or other suitable device.

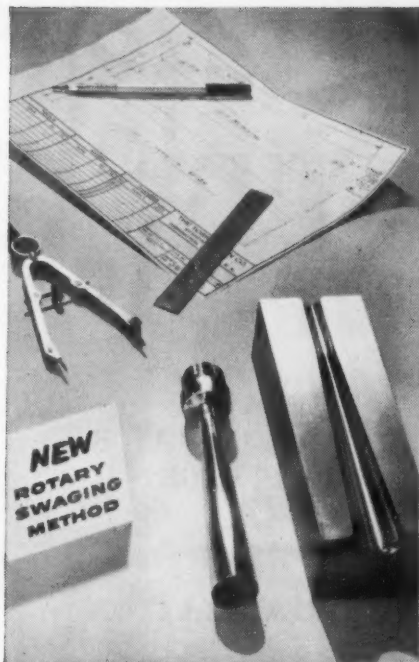
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ROTARY SWAGING

eliminates waste and scrap



A Torrington Rotary Swaging Machine shapes work instead of cutting metal away, eliminating waste and scrap—cutting processing time as well.

This part was originally turned from a solid brass bar weighing 3 pounds. Cutting cycle was 86 seconds. When swaged from tubing, stock weight was reduced 83%. Swaging of tube and assembling the head took a total of 12 seconds.

If your operations include reducing, tapering, pointing, sizing, bonding, forming inside contours or threads—swaging can save you time, money and material.

Write today for our informative booklet on Torrington Rotary Swaging Machines. Or ask to have a technical representative call to show you how rotary swaging can achieve new savings in your plant.

THE TORRINGTON COMPANY
Swaging Machine Division
730 North Street, Torrington, Conn.

Advantages of Rotary Swaging—

- 1 **Savings in material**—swaging is chipless—shapes the work instead of cutting metal away.
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- 3 **Improved products**—swaging improves grain structure, tensile strength, resiliency and finish. Produces work accurate to $\pm .001$ " and better.



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TORRINGTON ROTARY SWAGING MACHINES

Makers of Torrington Needle Bearings

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Unbeatable Team for Precision Height Measurements!

Now you can speed up setting and transfer of precision height measurements from surface plates and machine tables! With the new Brown & Sharpe *Hite-Set* and *Hite-Chek* you can make as many different measurements as the work requires . . . without reassembling or extra parts . . . and with consistently high accuracy on repeat settings. Write for full details. Brown & Sharpe Mfg. Co., Providence, R. I.



HITE-SET

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YOUR LOCAL DISTRIBUTOR

Here's How
the Team
Operates...

1. New *Hite-Set* — merely turn instrument's super-micrometer thimble to raise or lower measuring blocks . . . read jet-black figures and graduations directly in .0001ths. Measuring faces are long-wearing carbide. Measuring blocks are exactly .5000" . . . under surfaces can be used without extra attachments. Blocks accurate over entire range to within .00005".



HITE-CHEK

2. New *Hite-Chek* — provides super-solid support for transferring precise measurements between the *Hite-Set* and work-piece, using dial indicators. Fine-screw adjustment on instrument arm provides $\frac{1}{16}$ " range for easy, accurate setting. Arm is integral part of adjustable slide which locks positively in desired position. Extra-rigid post protects accuracy on the closest measurements.

B&S

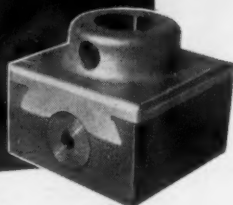
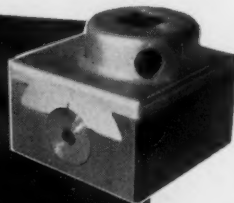
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Which boring head will do your job?

CRITERION makes a wide range —
1½ to 7 inches in diameter.
Bore accurate holes ⅛ to 20 inches.

CRITERION Heads feature widely
spaced graduations — Easy reading
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construction — Dependable opera-
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free performance.



Ground shanks
and adapters
for all popular
machine tools

CRITERION TOOL PRODUCTS



Select your boring head
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shank tools.

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Check the application of
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Save time—Money—Elim-
inate excessive tool change.

BORING TOOLS
Boring, grooving and
internal threading
tools are stocked in
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CRITERION MACHINE WORKS
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Consult your dealer or write for free catalog.

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ONE COMPLETE REFERENCE FOR YOUR ONE SOURCE OF DIE-SET ACCESSORIES

More than 200 pages featuring
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Danly's new "Leadership Line" of die sets and diemaker's supplies is a major development in the stamping industry — certain to affect every toolroom and die shop in the country.

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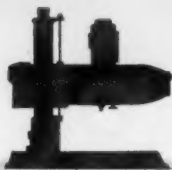
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NEW HEAD CONTROLS make Fosmatic Radial easier than ever to run!

Numerical Dials select feeds and speeds quickly, easily, with minimum possibility of error. Select even while drill is running, to save time on next operation.

Single Control Lever starts, stops, reverses and shifts to feed and speed set on numerical dials.

Push Buttons on quick return levers engage feed. Feed is disengaged automatically by depth control or by pushing either button again. Magnetic clutch needs no adjustment.

Head Traverse Lever also elevates arm. Variable speed hydraulic motors drive both traverse screw and elevating nut. Clutches eliminated.

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Radial Drills



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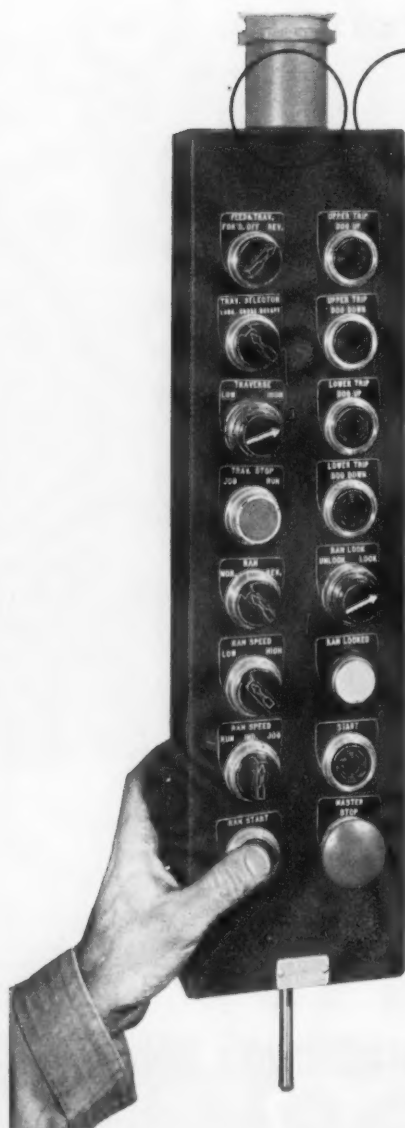


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production benders

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speeds operation
and set-up on
new Rockford
hydraulic slotter

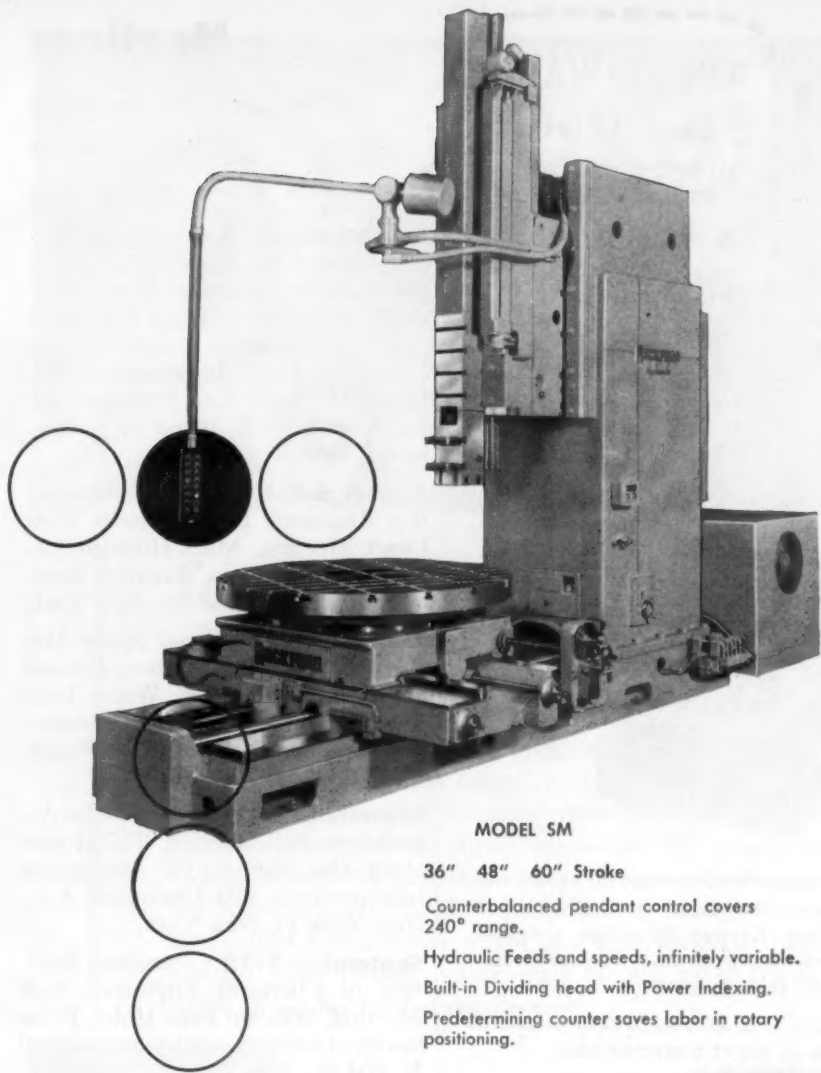
All longitudinal, transverse and rotary movements are selected and operated from the push button station of this new Rockford hydraulic Slotter.

The ram lock is pendant operated and ram stroke length and position are completely push button controlled.

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Full hydraulic drive provides two cutting ranges, one for high speeds and low cutting forces; the other for slow speeds and heavy cuts.

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MODEL SM

36" 48" 60" Stroke

Counterbalanced pendant control covers
240° range.

Hydraulic Feeds and speeds, infinitely variable.

Built-in Dividing head with Power Indexing.

Predetermining counter saves labor in rotary
positioning.

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HYDRAULIC

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July, 1956

modern machine shop 47



That's right. For as little as one cent and in just one minute you can cut a keyway with a *Minute Man* Keyway Broach Kit. For keyways from $\frac{1}{16}$ " to 1" in any bore from $\frac{1}{4}$ " to 3".



Minute Man Broaches for square and hexagonal holes and Production Type Keyway Broaches are also available from stock at your Industrial Distributor's.

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MAIL FREE BROACH CATALOG AND PRICE LIST S describing 26 standard kits, 49 standard broach sizes, 59 standard bushing sizes and a wide range of SPECIAL BROACHES to

Name
Company
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Meetings

Important Meeting Dates

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

July 30-August 3 • American Machine Tool Distributors Association and National Machine Tool Builders' Association, Machine Tool Sales Conference, Purdue University, Lafayette, Indiana. Information: National Machine Tool Builders' Association, 2071 E. 102nd St., Cleveland 6, Ohio.

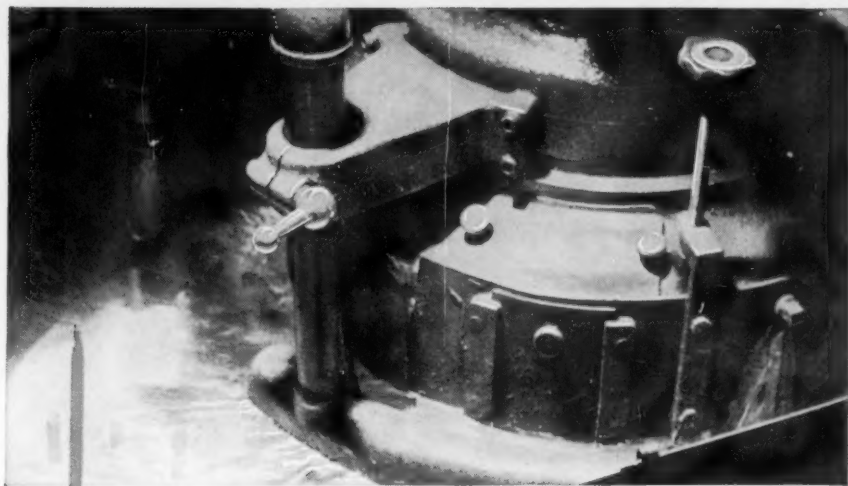
August 6-8 • Society of Automotive Engineers Inc., National West Coast Meeting, Mark-Hopkins Hotel, San Francisco. Society headquarters: 29 W. 39th St., New York.

August 7-8 • National Screw Machine Products Association, National Sales Conference, Wade Park Manor Hotel, Cleveland. Association headquarters: NSMPA Building, Cleveland 20, Ohio.

September 7-9 • Metal Powder Association, Fall Meeting, The Homestead, Hot Springs, Va. Association headquarters: 420 Lexington Ave., New York 17, New York.

September 9-12 • American Institute of Chemical Engineers, Fall Meeting, William Penn Hotel, Pittsburgh. Institute headquarters: 120 E. 41st St., New York 17, New York.

September 9-12 • National Metal Trades Association, Eastern Plant Management Conference, Essex-Sussex Hotel, Spring Lake, N. J. Association headquarters: 122 S. Michigan Ave., Chicago 3, Illinois.



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K-7 gives superior results in grinding all steels, cast and malleable irons, titanium, carbon, rubber, ceramics and plastics (not recommended for non-ferrous metals). This all-chemical water soluble liquid concentrate is transparent and colorless in solution, is non-foaming and runs absolutely flat under all conditions. Low pH (alkalinity) makes it easy on the skin. K-7 solutions do not load work wheels, and this means fewer dressings, longer wheel life and a true ground finish. Write for further details today.



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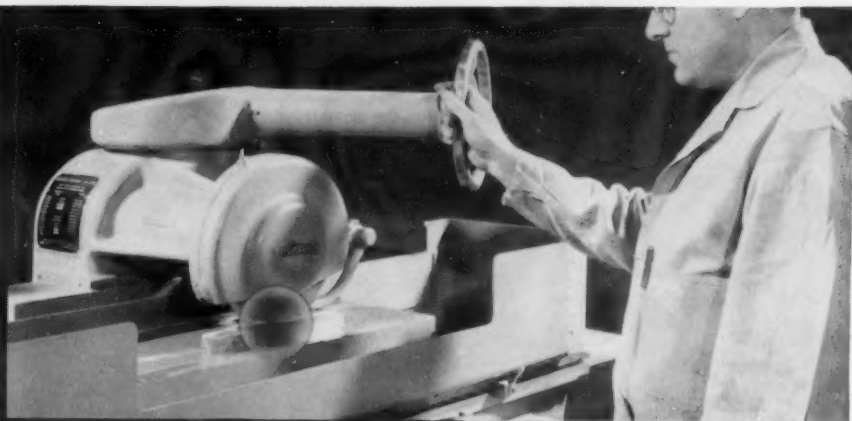
BOX 216, PORTLAND, CONNECTICUT

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Here's the ONE outstanding wheel... for EVERY toolroom surface grinder

The Norton G BOND-32 ALUNDUM combination
is unequalled for speed, versatility and economy*





The Norton G Bond is the most efficient vitrified bond ever developed for precision and semi-precision grinding. Wheels made with it bring you these valuable advantages:

Cooler, faster cutting action . . . heavier cuts without burning . . . closer tolerances and smoother finishes . . . easier dressing and more pieces per dressing . . . more work, and more kinds of work, per wheel.

Norton 32 ALUNDUM abrasive is another big advancement in grinding progress. It grinds exceptionally cool and fast, with minimum dressing, and is ideal for surface grinding jobs requiring fast stock removal and heavy feeds.

See Your Norton Distributor

for further facts on how the G Bond and 32 ALUNDUM abrasive add the "Touch of Gold" that saves time and money and improves product quality. Or write to the nearest district office of NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. Behr-Manning Company, Troy, N. Y., division of Norton Company. Export: Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

*Trade-Mark Reg. U.S. Pat. Off. and Foreign Countries

THE FAMOUS NORTON G BOND holds each abrasive grain just long enough for maximum cutting action, assuring a constant grinding surface of fresh, sharp cutting edges. With 32 ALUNDUM abrasive it makes a great "Touch of Gold" team for grinding high speed and alloy steels. For other applications investigate Norton 38 ALUNDUM or 19 ALUNDUM abrasive. And remember, only Norton offers you such long experience in both grinding wheels and grinding machines to help you produce more at lower cost.

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Crystal Lake • Delta • Doall
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to make your products better*

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W-1716

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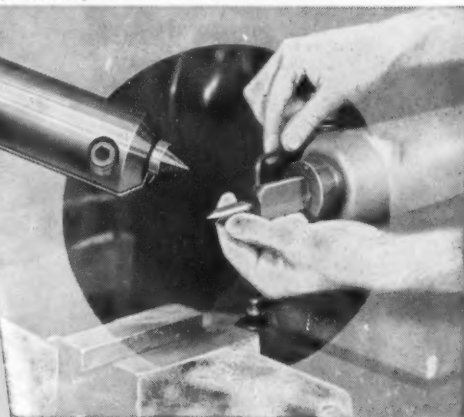
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(Patented)

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THESE

Grip-Tip FEATURES

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- Replaceable Carbide Tips
- Easy Insertion and Removal of Male or Female Tips
- Reduced Machine Down-Time
- Lower Cost for Replacement of Carbide Tips
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with

REPLACEABLE CARBIDE TIPS

Grip-Tip Centers are specifically designed to substantially reduce your replacement costs and machine down-time for regrinding or replacement of worn or chipped centers.

Male or female carbide tips are inserted or removed from the tool steel holders by simply turning a screw. The unique clamping action of holders on tips is positive and quick . . . you save replacement time with Grip-Tip Centers.

The life of Grip-Tip holders is practically unlimited, for, only the dull or chipped carbide tips are

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Grip-Tip Centers increase your production by permitting full utilization of machine tools. It takes but a minute to remove old carbide tip and replace with a new one . . . machine down-time is less with Grip-Tip Centers.

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modern machine shop

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modern machine shop
431 Main St. Cincinnati 2, Ohio

July, 1956

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**3 Ft. PRECISION
RADIAL DRILL**
with
**FLAME HARDENED
COLUMN**



GUARANTEED
for 1 year against
defective parts or any
mechanical defects.

\$2950⁰⁰
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Send for our new brochure describing the 16 points of superiority of the VEET Precision Radial Drill.

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modern machine shop 53



still the winner

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The winner and still champion after fifty years is Crucible's REX high speed steel. *And now it's better than ever!* Recent improvements in manufacturing processes have given even higher quality and greater uniformity to every one of its properties.

Why not shop test the new REX yourself? Test it for size, structure, response to heat treatment, fine tool performance. Give it any test you wish. You'll see why it is today, as it has always been — *the standard by which all other high speed steels are compared.*

Ask for REX by name at your local Crucible warehouse. Or order it directly for prompt mill delivery. And for information on REX, and the other Crucible special steels, send for the *Crucible Publication Catalog*. Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.

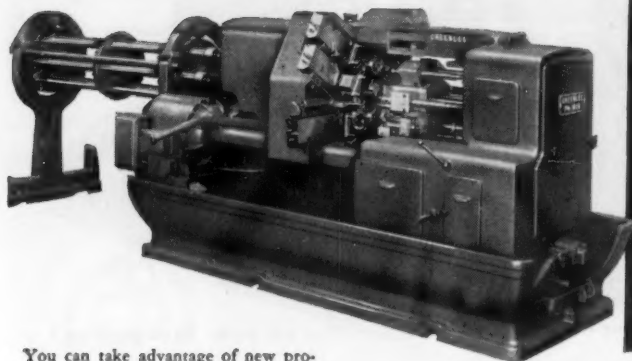
CRUCIBLE

first name in special purpose steels

Crucible Steel Company of America

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GREENLEE
SIX-
SPINDLE
AUTOMATICS

You can take advantage of new production techniques...attain higher levels of efficiency with the improved Greenlee 6-Spindle Bar Automatic. Its advanced design opens the door to some real profit opportunities. • These design improvements are fully described in a catalog recently issued. Let us send you a copy today. Find out how Greenlee Automatics can save time and money in your plant. It will pay you to investigate.



WRITE FOR
CATALOG
No. A405

IMPROVED SPINDLE CONSTRUCTION

The spindle has been completely redesigned to assure greater accuracy at higher speeds. True running...the new Greenlee spindle has five widely spaced, preloaded, angular-contact, precision ball bearings. Entire spindle is dynamically balanced for smooth operation. Metallic seals, labyrinth and friction washers with line contact provide maximum heat dissipation.

INCREASED SPEED

Spindle speed range has been increased. Enables you to take full advantage of the top efficiency and peak performance which carbide and high-speed tooling offer. Reduces downtime losses and tool costs.



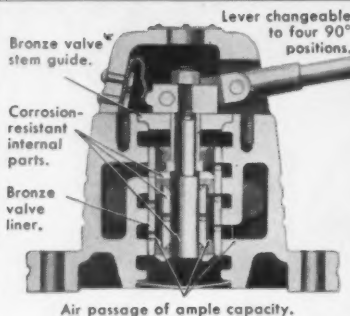
GREENLEE BROS. & CO.
1887 Mason Avenue
Rockford, Illinois

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Eliminate breakdown by choosing Rivett Valves!

**LONG LIFE ASSURED BY
SIMPLE, COMPACT DESIGN**



Flexibility for designing any circuit



Be confident of continuous, uniform control by using Rivett Air Valves. Design assures easy operation, long life—precludes need of adjustment—prevents leakage. Easily disassembled for servicing or modification. 5 sizes: $\frac{1}{4}$ ", $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " and 1".

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Working drawings, specifications, cut-away views—in 12 fact-filled pages. Write for free copy today!



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Dept. MMV7, Brighton 35, Boston, Mass.

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RIVETT

furnishes a complete power package

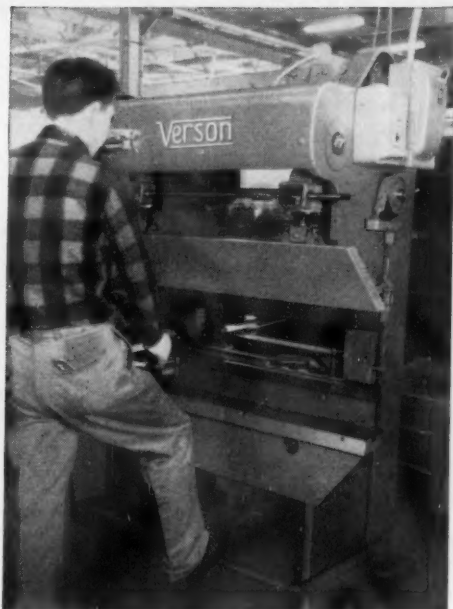
AIR AND HYDRAULIC—VALVES, CYLINDERS, POWER UNITS

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*Convenient as
ordering from
your corner
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**PRESS BRAKES
FROM
STOCK**



It's simple, quick and convenient. There are no involved proposals, no long waits . . . Verson standard press brakes are *immediately* available from stock.

Prices are the same too! Because of the large demand and high volume of sales you can still get a Verson Model 16-48, 16 ga. x 48" capacity, for \$1,600* and a Model 1062, 16 ga. x 78" capacity, for \$2,630*. All with that Verson quality, designed and built for long life and top performance.

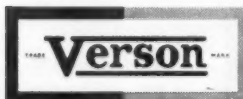
Write for specifications, then just place your order.

**New, Improved,
Fully Enclosed
VERSON
SHEET FLOATERS**

Easiest, most economical way to separate steel sheets and blanks. Available in 3 models, each with 7 sizes. Write for descriptive literature and prices.

**FOB Chicago, less dies.*

A Verson Press for every job from 60 tons up.



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VERSON ALLSTEEL PRESS CO.

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**MECHANICAL AND HYDRAULIC PRESSES AND PRESS BRAKES • TRANSMAT PRESSES
TOOLING • DIE CUSHIONS • Verson-WHEELON HYDRAULIC PRESSES**

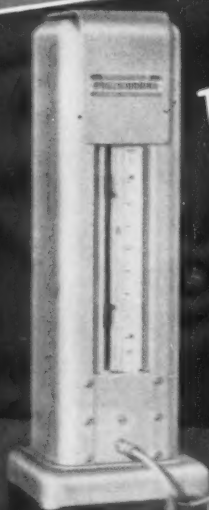
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July, 1956

modern machine shop 57

What You Can

**WITH SHEFFIELD'S
PRECISIONAIRE**

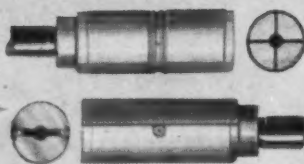


**The MOST
USABLE
OF ALL
AIR GAGES**

CHARACTERISTICS

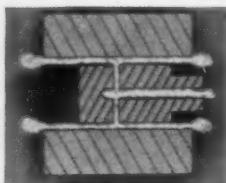
- High precision with instant response
- Has widest amplification range —
100 to 100,000-1
- Accommodates widest tolerance range —
.000005 to .100
- Amplifications and tooling interchangeable
- Provides quickest change in amplification
- Longer scale facilitates classifying parts and
provides greater approach range
- Easier to read — no need to squat and squint
- Human error minimized
- Checks one dimension or many simultaneously
- Elements have long service life

BASIC INTERNAL TOOLING ELEMENTS

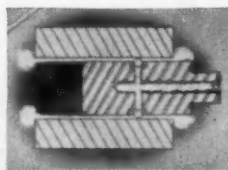


AIRJET SPINDLE

For True Diameter



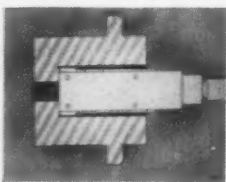
Standard stock spindle with two diametrically opposed open jets for holes having tolerances of .005" or less and surface finishes of less than 65 rms.



Balljet Spindles used for holes in porous or soft materials and for internal surfaces rougher than 65 rms.



Plunjets mounted in a suitable fixture are used for larger holes and those having larger tolerances.

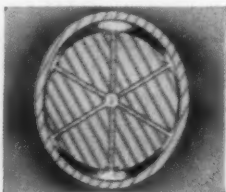


Bladejet Spindles are used in interrupted bores, bores having a keyway, to gage to the very bottom of a blind bore and for larger tolerance bores.



Adjustable spindles and kits are available to cover ranges of $\frac{3}{16}$ " to $\frac{1}{4}$ "; $\frac{1}{4}$ " to $1\frac{1}{2}$ "; 1" to 3"; $1\frac{1}{2}$ " to 3" and 3" to 12".

For Average Diameter

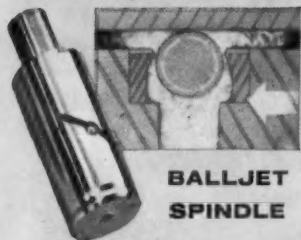


Spindles having three or more jets equally spaced around the perimeter—especially effective in checking thin wall components.

7210

MORE PRECISIONAIRES BOUGHT

Learn About Holes*



**BALLJET
SPINDLE**

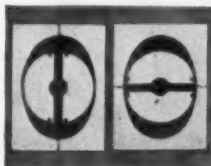


**BLADEJET
SPINDLE**



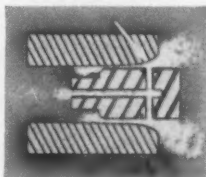
**PLUNJET
CARTRIDGES**

For Out-of-Round



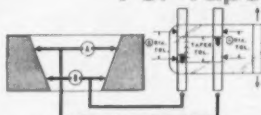
Indicated when any spindle is rotated through 90 degrees.

For Bell-Mouth



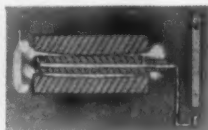
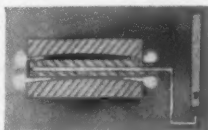
Indicated as any spindle enters or is withdrawn from the bore.

For Taper



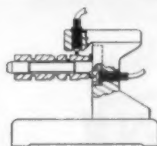
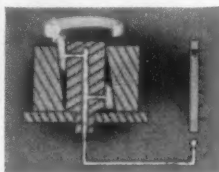
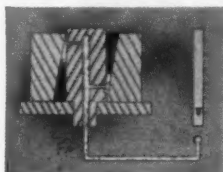
Indicated as any spindle is passed through the bore. Spindles having two or more sets of jets may also be used. In larger bores and/or those having larger tolerances, Plunjets in a suitable fixture are used.

For Camber



Camber or straightness of a hole is checked by rotating through 180° a spindle having four jets as indicated.

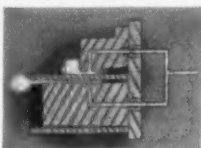
For Squareness of a Bore Axis with a Face



Spindle with opposed open orifices spaced longitudinally checks squareness of a bore axis with a face.

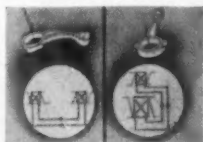
Plunjet fixtures may also be used.

For Concentricity



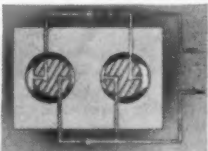
Opposed jets in a locating fixture.

For Parallelism of Holes



By integrating two spindles in a fixture, such as those used for squareness checking.

For Center Distance Between Holes



By a fixture with two spindles each having two opposed jets.

*For checking external dimensions, relationships and countless other conditions, write to Dept. 12, **THE SHEFFIELD CORPORATION**, Dayton 1, Ohio, U.S.A.



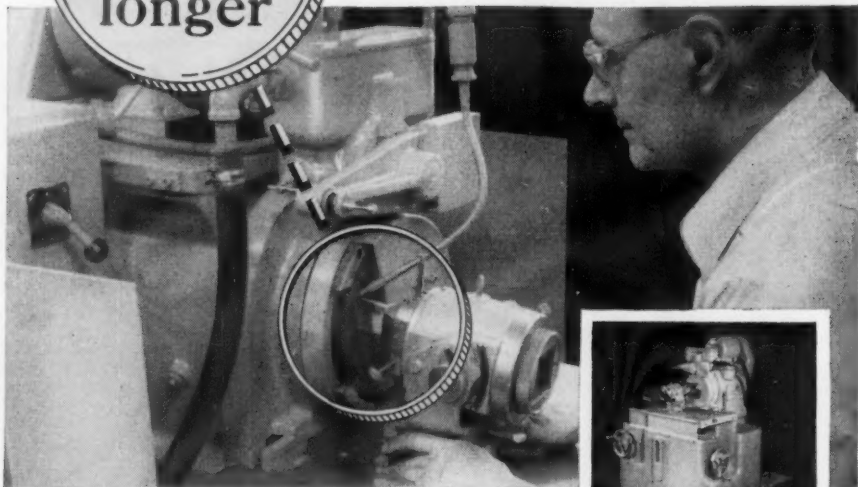
SHEFFIELD
manufacture and measurement for mankind

THAN ALL OTHER MAKES OF AIR GAGES

**makes
tools last
longer**

Unequalled

*for carbide tool sharpening,
the Norton No. 2
Bura-Way Grinder...*



BURA-WAY does it better. This Norton Tool Grinder for convex single point and form tools: (1) generates, reproduces and maintains relief angles *constant in the direction of feed*, providing uniform support to the cutting edge and; (2) insures exact duplicates of the master tool form.



When your operator sharpens your carbide-tipped tools on the Norton No. 2 BURA-WAY Grinder he adds longer life value to these tools, helping you to make more profit and turn out better products for your customers.

Precise Duplicates Every Time

In the BURA-WAY No. 2 you have the ideal tool grinder. The BURA-WAY method increases tool life and gives you more pieces per sharpening. By exact duplication of the master tool, tremendous additional benefits may be realized from an effective tool control system and reduced set up time when changing tools.

Find Out More

Get in touch with your Norton representative whose knowledge and experience is further supplemented by Norton trained engineers. Only Norton offers you such long experience in both

grinding machines and wheels to help you produce more at lower cost. Write NORTON COMPANY, Machine Division, Worcester 6, Mass.

To Economize, Modernize With NEW



GRINDERS and LAPPERS

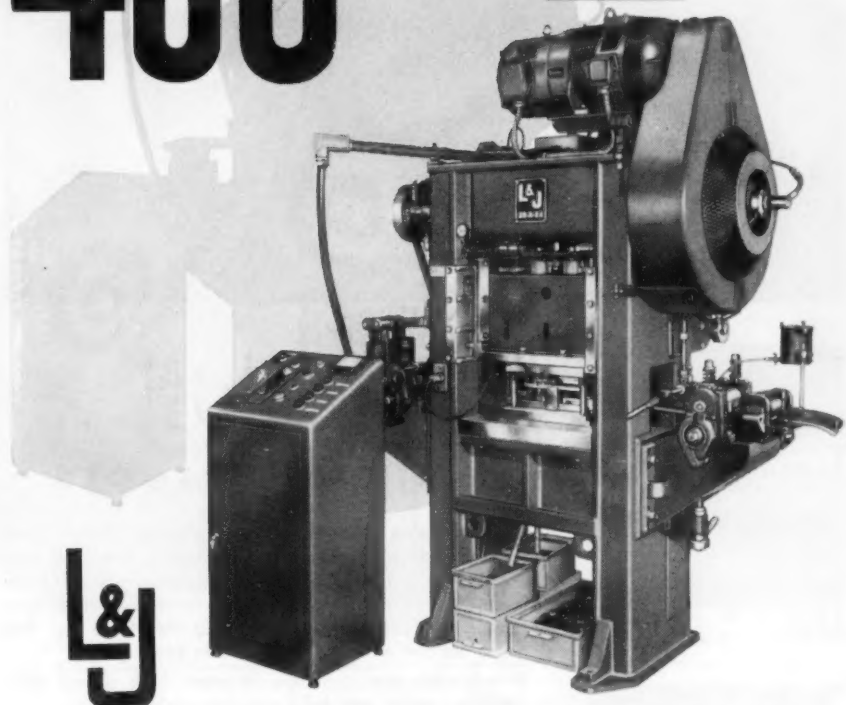
Making better products...to make other products better

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450 S.P.M. to keep production costs down



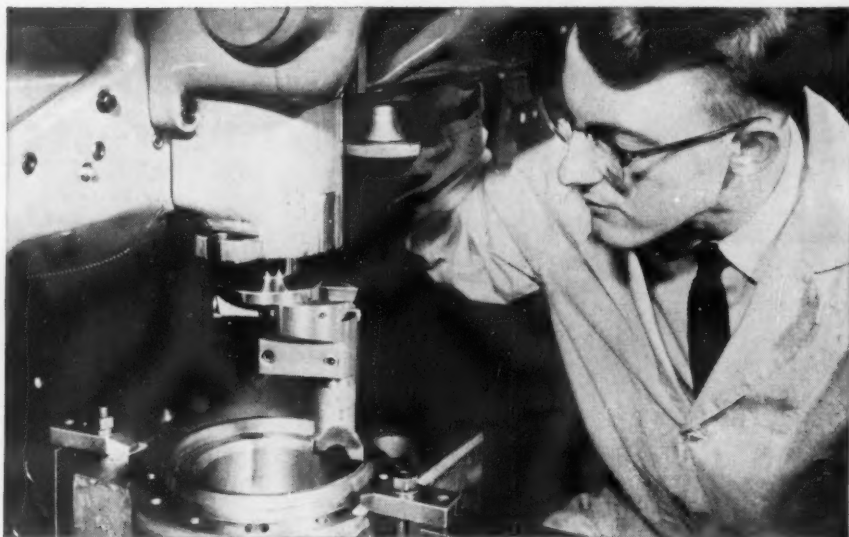
DOUBLE CRANK STRAIGHT SIDE PRESS

Here's new life for lagging production — speeds up to 450 strokes per minute to give you new highs in the output of small precision parts. Designed primarily for use with progressive dies this versatile press gives you everything you need — speed — accuracy — big capacity — long die life — ease of set-up. It pays off in lower production costs.

Specifications: Capacity 20 tons • Speeds 150-450 strokes per min. • Ram area 24" x 12". Also, 30, 40 and 50 ton models. Write for information.

L & J Press Corporation • 1624 Sterling Ave. • Elkhart, Indiana

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STYLE A
for general boring



STYLE B
for bottoming and facing



STYLE C
for internal threading

PRECISION... *in BORING TOOLS*

You can bore smooth, straight, precision holes when you use Bokum standard tools. They're designed with accuracy in mind—all cutting and clearance angles have been figured to a mathematical formula so that they remain constant throughout the long life of the tool. You get a uniform and accurate bore in every piece.

Bokum tools are available in super high speed steel, carbide-tipped and solid tungsten carbide.

Resharpener is simple. Bokum tools are helically and radially backed off—must be sharpened on the top face only. Larger tools are made in two pieces with interchangeable cutting heads. Result: you eliminate special tools—cut costs when you standardize on Bokum.

Write today for catalog covering standard boring tools.



TRADE MARK REG. U. S. PAT. OFF.

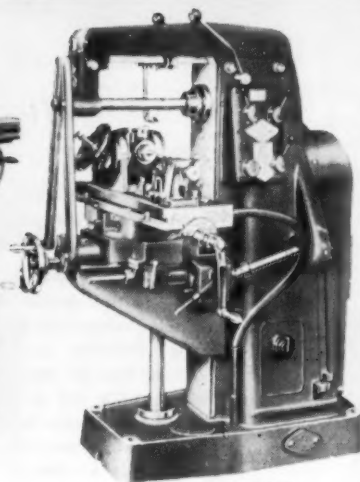
BOKUM TOOL CO.

14775 Wildemere Ave.,
Detroit 38, Mich.

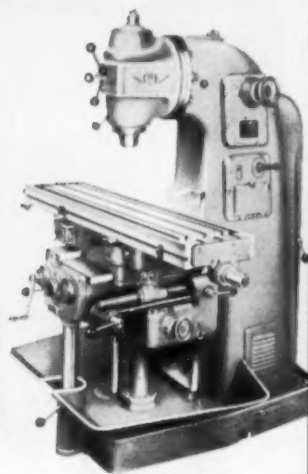
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OUTSTANDING VALUES!

PEDERSEN HORIZONTAL, VERTICAL AND COMBINATION MILLING MACHINES



VPU-0



VPV-2

PEDERSEN UNIVERSAL TOOL & CUTTER GRINDER, MODEL U.S.I.

Main spindle rated at 3,800 to 5,750 RPM.
Especially fine internal grinding spindle
rated at 19,000 RPM maximum. (optional)
Special table and saddle bearing arrange-
ment insures smooth and easy table
movement.
Many accessories available.
36 1/2" x 5 1/2" table working surface:

SPECIFICATIONS	VPU-0	VPV-1	VPV-2
Table size	39 1/2" x 9 1/2"	51" x 12"	61" x 12"
Longitudinal travel	28 1/2"	37"	42"
Cross travel	7 1/2"	7 3/4"	9"
Vertical travel	15 1/2"	15 3/4"	18"
Speed range, rpm	38-1,000	26-630	53-1,200
Net weight	2,200 lbs.	2,800 lbs.	3,850 lbs.
Prices, from	\$2,595	\$2,995	\$6,490

\$2,595.00

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LIBERAL TERMS

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RENTAL PLANS

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- ★ MINIMIZE TAP BREAKAGE! ★ INCREASE TAP LIFE!
★ GET MORE ACCURATE, BETTER-FINISHED THREADS!

NEW DAVIS *tap-saver*

Automatic Torque Control
TAPPING HEAD

adjusts driving torque to suit material, type of tool and size of tap

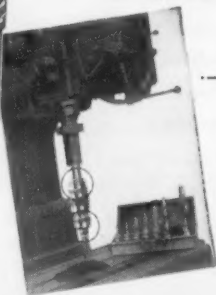
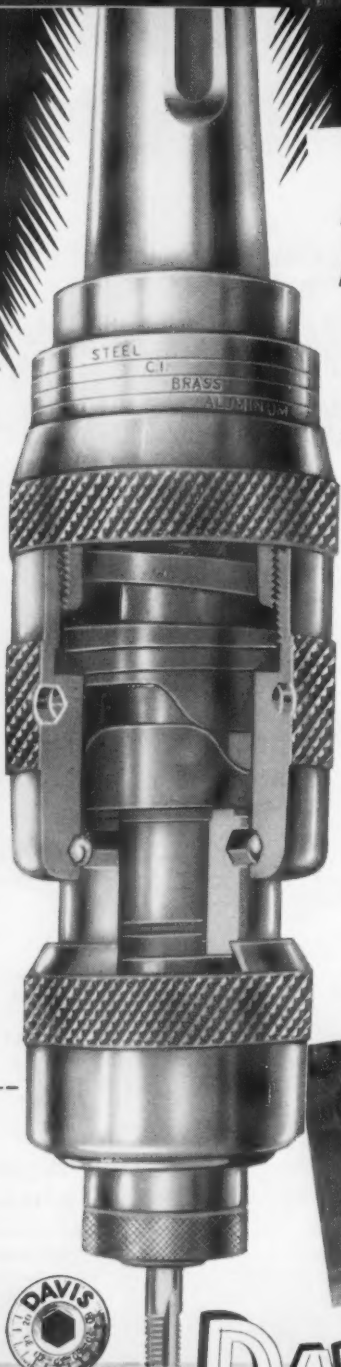
Turn the material selector dial to the proper setting...insert the tool with its proper collet...and your TAP-SAVER tapping head automatically provides exactly the right driving torque for all working conditions!

What's more, this torque is always accurately maintained. Whenever resistance increases, controlled slippage in the overriding clutch within the tapping head compensates for it. Think what this means in terms of operating advantages! Tap breakage is virtually eliminated. Thread accuracy and finish are improved materially. And output rises profitably. Production time is also cut sharply as tools easily interchange in the TAP-SAVER'S quick-change chuck. A series of operations on the same hole can be completed without repositioning either spindle or the work—only the collet and tool are changed.

Investigate now—learn how the new Davis TAP-SAVER can solve many production problems for you and quickly pay for itself in decreased machining costs. WRITE FOR BULLETIN No. DB-160.

Machining Advantages

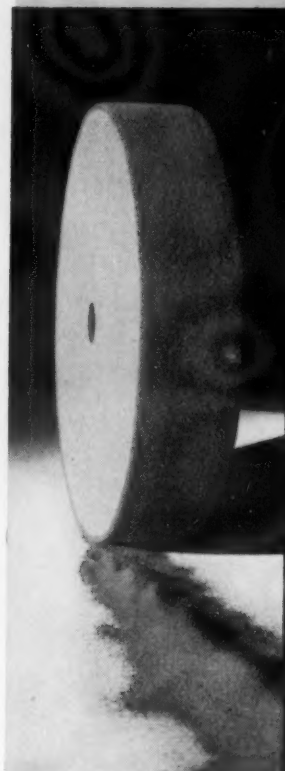
- ▶ Eliminates "forced," "chattered" and "stripped" threads as well as broken taps—no damage to starting threads when withdrawing tap.
- ▶ TAP-SAVER head does either right or left-hand tapping, drilling, reaming, spot facing and counterboring. Cuts hole time by half.
- ▶ One dial setting covers all work on any material. Absolute safety under all conditions with all tools, in through or blind holes.
- ▶ Three sizes of tapping heads are supplied as standard with Morse taper shanks Nos. 3 through 7. Special shanks or draw key slots for any machine are available on order. Each head furnished in steel box with three drill collets and seven tap collets in appropriate sizes.



DAVIS

BORING TOOL DIVISION

GIDDINGS & LEWIS MACHINE TOOL CO., Fond du Lac, Wisconsin



Norton ALUNDUM B abrasive consists of grains of uniform blocky shape. No flats, slivers or undersize grains to loaf on the job. No oversize grains to mar surfaces. Made in all grit sizes, from 20 through 240, to cover the widest range of polishing operations.



You polish with the "Touch of Gold" when your wheels or belts are coated with ALUNDUM B abrasive. This extremely hard, sharp grain cuts fast, clean and cool. And the Norton special high capillarity treatment means easier wetting with cement or glue — for maximum adhesion, longer wheel life and better polishing performance.

More, and better, polishing with every set-up

**ALUNDUM* B abrasive brings the cost-cutting,
value-adding "Touch of Gold"**

Ask Your Norton Distributor for the booklet "Setting Up Metal Polishing Wheels and Belts." Or write to the nearest district office of NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. Behr-Manning Company, Troy, N. Y., division of Norton Company. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

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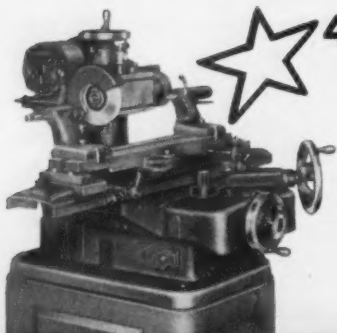
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*Making better products...
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NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Behr-cat Tapes

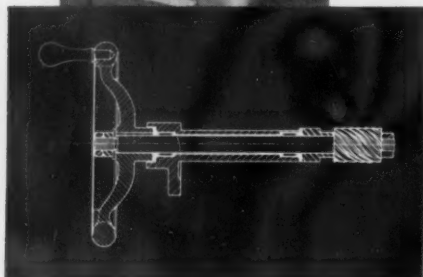
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★ 4 of the reasons why **EXCEL NO. 6**

UNIVERSAL CUTTER and TOOL GRINDER

is your best buy for keeping
your reamers and milling
cutters in first class
condition



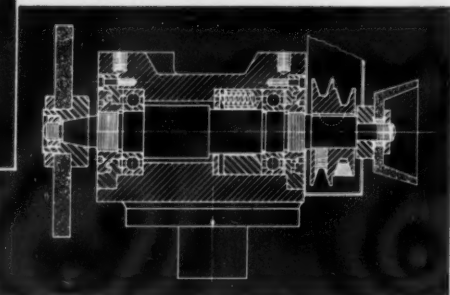
★ **S-M-O-O-T-H TABLE MOVEMENT**

Hardened spiral teeth of
table control mesh smoothly
with rack gear of top table.

★ **CYLINDRICAL AND INTERNAL GRINDING**

Readily adaptable for these opera-
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grind, too.

★ **LOW COST** includes all standard attachments—\$1,135.00, including the pedestal.



★ **AUTOMATIC TAKE-UP FOR SPINDLE WEAR**

End play automatically taken up by
spring preloaded ball bearings,
eliminating wear. Spindle is full
1½" dia., finest alloy steel. One end
tapered to receive grinding wheel
collet, other end straight ½" to fit
small cup wheels.

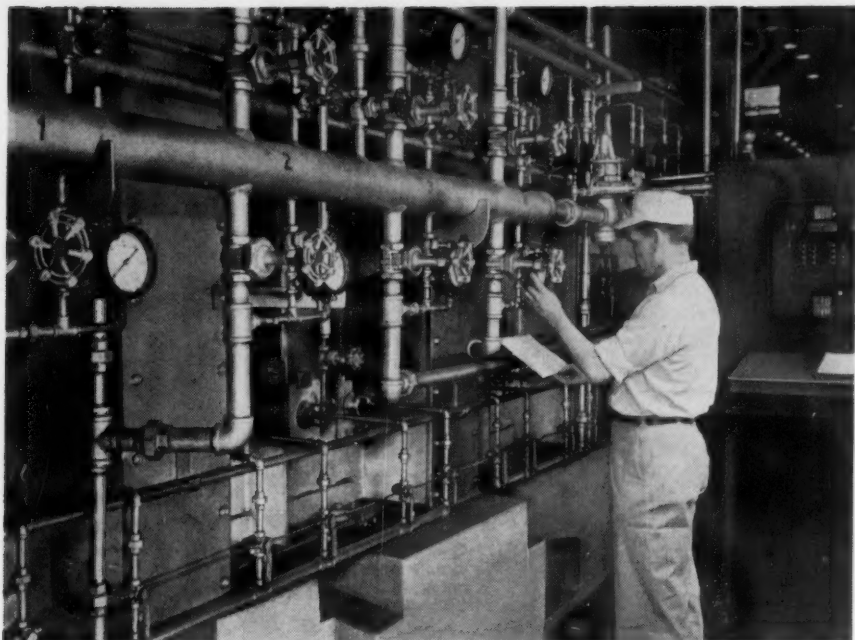
For full details on Excel No. 6, write Dept. M-76.

EXCEL PRECISION GRINDERS

BENTON HARBOR
MICHIGAN

HYDRAULIC & HAND FEED SURFACE GRINDERS • UNIVERSAL CUTTER & TOOL GRINDERS • DRILL GRINDERS

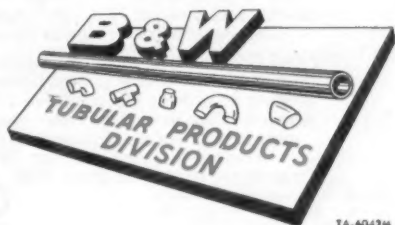
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Machinability can be a critical factor in the economical production of mechanical parts from tubing. This important characteristic of many alloy steels is largely determined by various types of heat-treatment. That's why uniform tubing machinability requires *precise control* of the heating and cooling cycle of the heat treating operation.

John Fencil, a furnace operator, is shown at work on one of the many heat treating furnaces at B&W. By regulating the 128 burners, 22 flues and 145 valves on this specially designed furnace he can completely control the heat treating cycle. Specialized furnaces such as this and trained operators like John assure that B&W alloy mechanical tubing is uniformly heat treated for economical parts production. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.



Seamless and welded tubular products, seamless welding fittings and flanges—in carbon, alloy and stainless steels
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CUT REPLACEMENT

COST

**More
than Half**

with **NEW T-J REAMERS**



LEFT HAND SPIRAL
RIGHT HAND CUT



RIGHT HAND SPIRAL
RIGHT HAND CUT



**REPLACE ONLY
THE PART
THAT WEARS OUT!**

1. Cuts replacement cost to less than half!
2. Quick change of heads saves time.
3. Easy to change heads for different metals, increases efficiency.
4. Head and arbor firmly locked together.
5. Wide range of sizes.

Exclusive in design . . . the New-type T-J Reamers cut your replacement costs to *less than half*! Only the quickly installed *head* to replace, after buying original shank. Wide range of interchangeable heads from $\frac{1}{2}$ " to $2\frac{3}{4}$ " inclusive, in $\frac{1}{16}$ " increments are available with right or left hand spiral flutes for thru or blind hole reaming.

Tapered hole in head insures concentricity and *new* thread design assures a snug fit on smoothly ground tapered shank. Reamer operates free from binding or sticking due to cutting portion wearing undersize and creating negative relief. Backed by T-J's 39 years of know-how as one of the largest manufacturers of die sinking milling cutters.

Tomkins-Johnson Co., 617 North Mechanic Street, Jackson, Michigan.

Exclusive, high potential territories open to responsible manufacturers representatives. Write today!

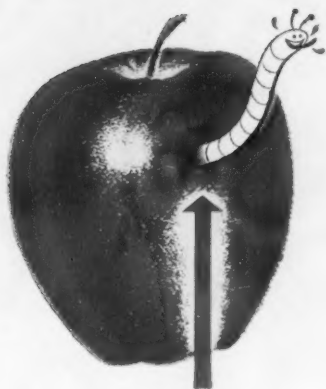


TOMKINS-JOHNSON

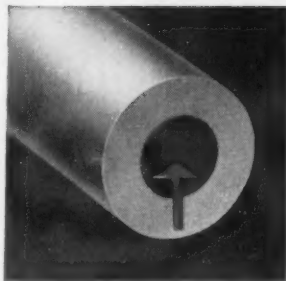
DIE-SINKING...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINDRILLS

39 Years Experience

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a hole here makes waste...



a hole here saves waste

Crucible Hollow Tool Steels save waste—time and money—whenever you need ring-shaped parts or tools with a center hole. For the hole is in the piece when you get it! You eliminate drilling, boring, rough-facing operations — save machine capacity for productive work.

And you can get Crucible Hollow Tool Steels in any of our famous tool steel grades...in bar lengths or saw cut to your individual requirements. They are made in practically any combination of O.D. and I.D. sizes. What's more, delivery is *immediate* with Crucible's popular KETOS oil-hardening, SANDERSON water-hardening, AIRDI 15 high-carbon high-chromium, AIRKOOL air-hardening, and NU DIE V hot work tool steel grades from warehouse stocks.

Next time you have an application with a center hole, let your Crucible representative show you how these hollow tool steel bars can save you money and time. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE

first name in special purpose steels

Crucible Steel Company of America

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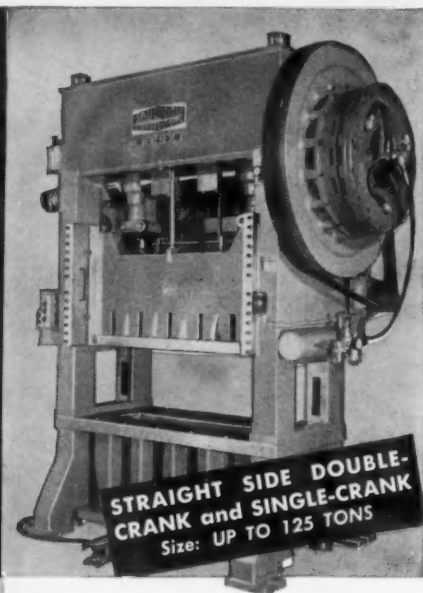
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JOHNSON

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- Box Type Ram
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- Bronze Gibs and Ball Seat
- Air Counter Balance

Write for Bulletin 1956

Also 22 MODELS OF OBI
MECHANICAL PRESSES
from 16 to 125 Tons Capacity

Johnson

**MACHINE
and PRESS CORP.**

620 WEST INDIANA AVENUE • ELKHART, INDIANA

For more data circle 269 on Reader Service Card

CLEEREMAN

DRILLING MACHINES

A battery of box column and round column Cleereman

Drilling Machines on production work. One of many such installations producing at lower costs with higher production, less operator fatigue and no down time.



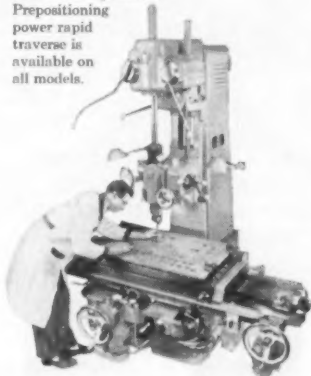
LAYOUT DRILLING MACHINE

A modern solution to an old problem. Built for those tool room and manufacturing jobs which do not require the ultra precision of Cleereman Jig Borers. The Cleereman Layout Machine is an economical machine capable of locating within .001" per foot and drilling, boring, reaming, tapping, etc., with utmost operator ease at a fast rate of production.



JIG BORER

Unexcelled precision for ultra-fine tolerances on highest quality gage, tool, die, jig and fixture work and on "jigless" production. Combines stamina with precision and ease of operation. Prepositioning power rapid traverse is available on all models.



CLEEREMAN MACHINE TOOL CORP., Green Bay, Wis.

For more data circle 270 on Reader Service Card

July, 1956

modern machine shop 71



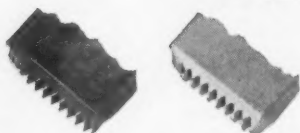
Liquid Honing*

Your Way
to Say:

**"MOST MODERN
PRODUCTION BLASTING
EVER
DEVELOPED!"**



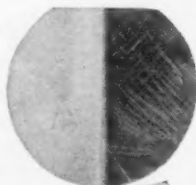
**This Machine
Should Be
Processing
Your Parts**



Vapor Blast Liquid Honing removes heat treat scale faster than conventional tumbling or any other process, and without pitting the steel.

**DOLLAR FOR DOLLAR, JOB FOR
JOB, NO OTHER SURFACE-
CONDITIONING METHOD CAN
EQUAL LIQUID HONING.**

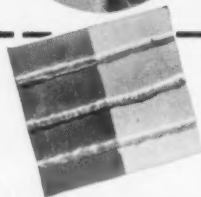
Metals, plastics, ceramics — any materials you use — can be Liquid Honed fast and to close tolerance. Send a sample scale-covered part with a letter describing your problem. Liquid Honing engineers will remove the scale and return the part with their recommendations. No cost to you...no obligation.



Vapor Blast Liquid Honing blends out grind lines, as shown in the area to the left. The smooth, non-directional surface is ideal for oil flow and unequalled lubrication. Liquid-abrasive action also hones down tiny burrs along edges of parts like this one.



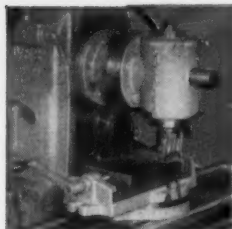
VAPOR BLAST MFG. CO.
3013 WEST ATKINSON AVENUE
MILWAUKEE 16, WISCONSIN



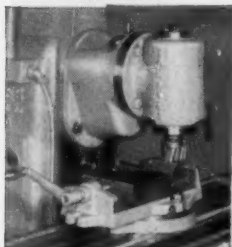
This unretouched photo of three weld seams shows how efficiently you can remove mill scale, rust, welding and heat discoloration. Top weld is stainless steel; next, copper brazing; bottom, common steel.

"Vapor Blast" and "Liquid Honing" are trademarks

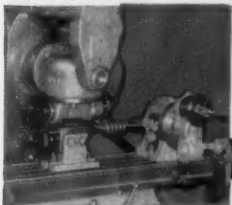
For more data circle 271 on Reader Service Card



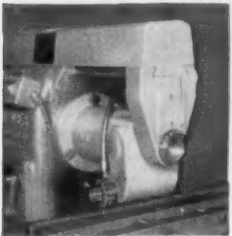
Heavy Duty Vertical
Milling Attachment



Heavy Duty Offset
Vertical Milling Attachment



Universal Milling Attachment



Rack Milling Attachment

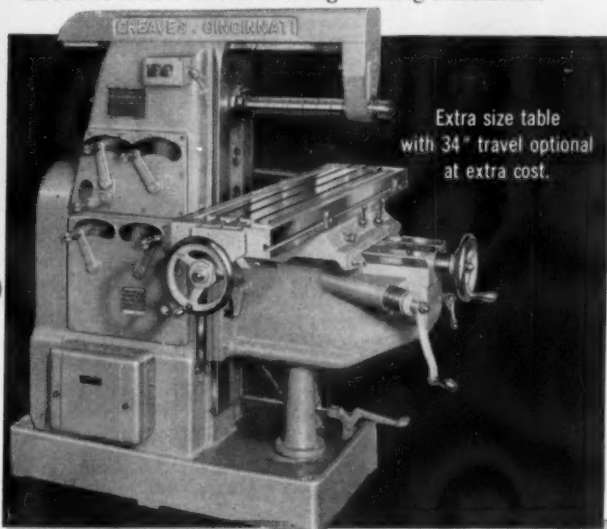
Send coupon for
**FREE Comparison
Chart** and detailed
descriptive literature,
on easy-to-use
attachments.

**Heavy duty attachments
increase versatility
of dependable, low-cost**

GREAVES MILLS

"THE MOST MILL FOR THE LEAST MONEY"

A full line of attachments and accessories offer outstanding flexibility for all types of milling operations . . . with GREAVES MILLS. Make your own comparison of 22 specifications of Greaves and 7 other leading milling machines.



Extra size table
with 34" travel optional
at extra cost.

GREAVES MACHINE TOOL CO.

2700 Eastern Avenue, Cincinnati 2, Ohio

Send Comparison Chart. I will make my own comparison of GREAVES MILLS with other makes.
Send information on Attachments and Accessories for GREAVES MILLS.

NAME _____ TITLE _____
FIRM _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

For more data circle 272 on Reader Service Card



RACINE

LOW COST...LARGE CAPACITY

Operating Features

- 1 **HYDRAULIC FEED AND CONTROL SYSTEM**—Pressures are controlled by a single graduated dial. Rate of feed is controlled by a small throttling valve.
- 2 **SWIVEL VISE** — Quick-acting self-positioning type for cutting any angles up to 45°.
- 3 **BEARINGS**—Extra large bronze bushings accurately press fitted are used on all rotary shafts.
- 4 **AUTOMATIC KNOCK-OUT**—Saw frame automatically rises to its highest point and motor is stopped at the completion of each cut.

MODEL 816 UTILITY SAW

A fully automatic hydraulically operated all-purpose saw that will handle the full range of general cut-off work.

Any metal from tough tool steel to mild bars, tubing and structural shapes up to 8" x 16" can be cut with speed and precision.

No clutch, trains of gears, levers or ratchet devices are used. The Racine Model 816 is designed with a minimum of easily accessible precision-made working parts that assure years of dependable operation.

Write for catalog giving specifications on RACINE'S complete metal cutting saw line.

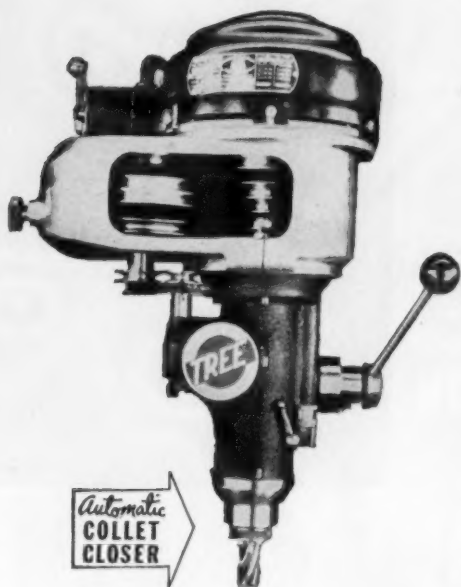


RACINE HYDRAULICS & MACHINERY, INC.

2070 Albert St., Racine, Wisconsin

For more data circle 273 on Reader Service Card

do you need . . . VERTICAL MILLING CAPACITY?



You can add vertical milling capacity by adapting the versatile TREE MH-4 Vertical Milling Attachment to your present horizontal milling machine. The MH-4 gives you all angle milling, drilling and boring with a high degree of accuracy because of its built-in rigidity. Spindle — alloy steel, hardened and ground. Roller drive eliminates back-lash. Quill — 4 inch travel. Enclosed micrometer depth stop. Power feed. Write today for full information.

Cincinnati



Nichols



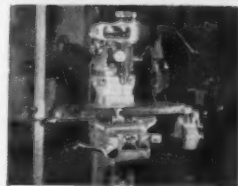
Kempsmith



Milwaukee



Bridgeport



EXPORT ADDRESS: States Trading Co., 401 Brdwy., New York 13, Cable Address: "STRADESO"

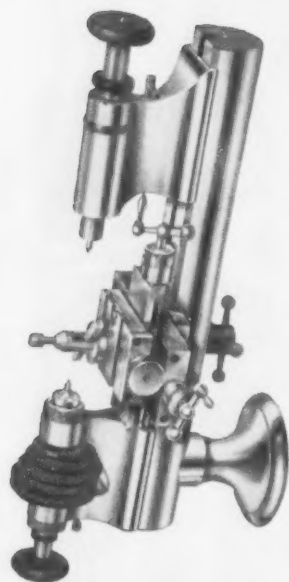
TREE TOOL AND DIE WORKS
1600 JUNCTION AVENUE RACINE, WISCONSIN

For more data circle 274 on Reader Service Card

July, 1956

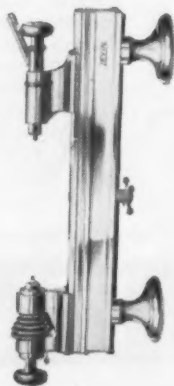
modern machine shop 75

**ARE YOU DRIVING TACKS
WITH A
SLEDGE HAMMER?**

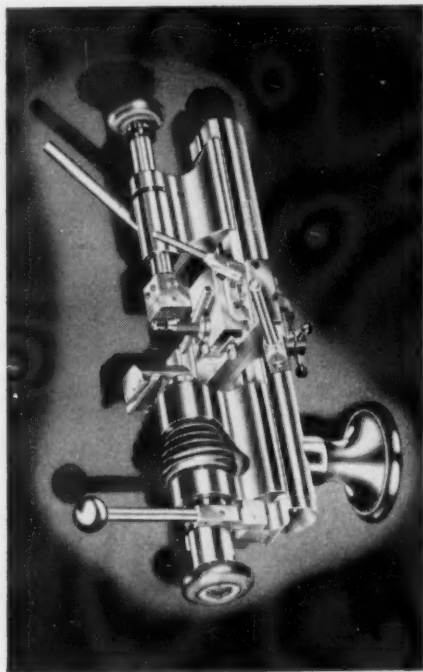


**SMALL PARTS ARE MADE WITH GREATER ACCURACY • ECONOMY • SPEED
ON *LEVIN* INSTRUMENT LATHES**

For efficiency small work should be done on a small lathe. In many cases the work done on an instrument lathe requires a degree of precision and fine finish which cannot be obtained from larger machines. LEVIN lathes are made in two collet capacities, 5/16" or 3/16", and thirty-three different models.



Send for Catalog M describing complete line of instrument lathes and accessories. Louis Levin & Son, Inc., 3610 S. Broadway, Los Angeles 7, California.



Why Grind or Finish-Bore?

PRECISION HONE!

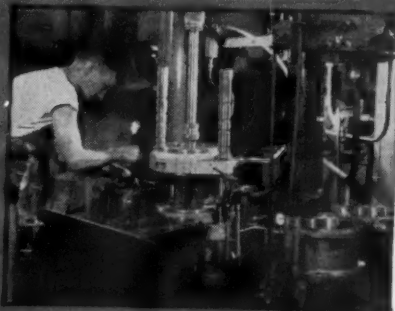
★ CHEAPER ★ FASTER
★ MORE ACCURATELY

with a FULMER HONING MACHINE!

Switch from grinding or finish boring to Fulmer Honing! There's a double saving: you cut costs and release boring or grinding machinery for other uses.

Fulmer Honing Machines speed production and lower costs. Ruggedly constructed and engineered to handle greater loads than normal. They assure low upkeep under the most severe operating conditions and provide ample cutting power to the stones.

FULMER machines are designed with a minimum number of parts for minimum maintenance. Five basic sizes provide a machine fitted to any needs. Fulmer precision honing



for precision-honing internal bores of ferrous and non-ferrous metals, glass, plastic etc.

usually outperforms conventional grinding or finish boring! Find out how! Write for Bulletin on Honing to: C. Allen Fulmer Co., Dept. S 107 E. 4th St., Cincinnati 2, O.

FULMER honing equipment

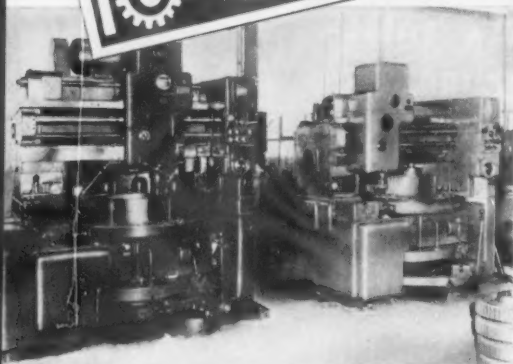
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"PUTTING TEETH" IN

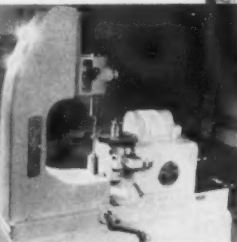


Fellows 36-Type Gear Shapers
at Philadelphia Gear Works:
powerful, accurate and fast on
long runs or special jobs.

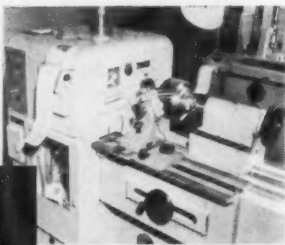
CUTTING INSPECTION



Fellows No. 12M Involute Measuring Instrument at Philadelphia Gear is simple to set up, checks involute profiles, and records any departure from specifications.



Fellows No. 20M Red Liner
automatically records all gear
errors in combination, giving
Philadelphia Gear a composite
check on quality.



Fellows No. 12H Lead Measuring Instrument checks lead, crown and taper and electronically provides charts of results for Philadelphia Gear.

THE
PRECISION
LINE

phillie gear[®] STANDARDS

*Integrated Fellows Gear Shapers and Inspection
Instruments Assure Close-Tolerance Production*

Consistently high quality is maintained at Philadelphia Gear Works by fast and accurate Fellows Gear Shapers teamed with Fellows Inspection Instruments. Inspection and recording by Fellows Instruments gives accurate warning of production errors and their nature, provides visible proof of gear quality. 'Phillie Gear' relies on Fellows equipment for producing gears for their famous Speed Reducers as well as many other industrial spur or helical gears.

Integrated production and inspection with Fellows equipment assures unified responsibility for meeting standards and precise quality control at lowest possible costs.

Ask any Fellows Representative for full information about the complete line of Fellows Gear Shapers, Shaving Machines, and Gear Inspection Instruments.

THE FELLOWS GEAR SHAPER COMPANY

78 River Street, Springfield, Vermont

Branch Offices: 319 Fisher Building, Detroit 2

5835 West North Avenue, Chicago 39

150 W. Pleasant Avenue, Maywood, New Jersey

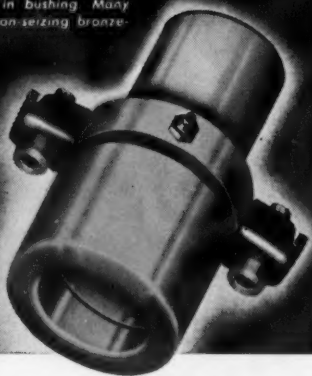
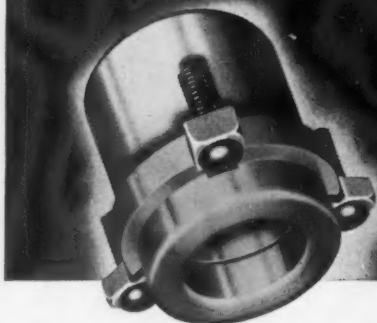
6214 West Manchester Avenue, Los Angeles 45

Fellows Gear Production Equipment

SEE THESE *New* GUIDE PIN BUSHINGS...

SHORT SHOULDER TYPE—For special applications. Available in non-seizing bronze plated hardened steel or solid Ampco bronze.

LONG SHOULDER TYPE—For use where pin should remain in bushing. Many sizes available in non-seizing bronze-plated steel.



*in this new
Lamina
catalog!*



If you build or use die sets, you'll want your free copy of the new Lamina Catalog in a hurry! This big new book contains 36 pages complete with illustrations, applications, dimensions and prices of more than 800 Lamina Guide Pins, Guide Pin Bushings and accessories. New models, sizes, styles and materials make the new Lamina line the most complete ever offered to men who want to cut press operating costs and improve die and press efficiency. Write us now for your free copy.

Lamina

DIES AND TOOLS, INC.

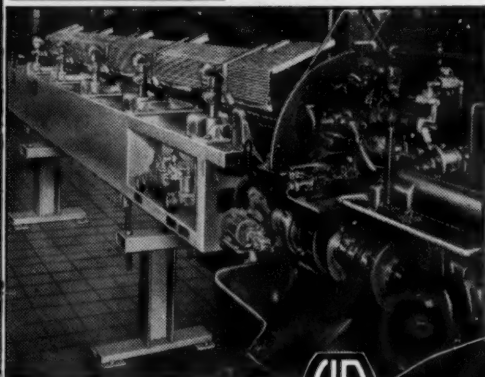
P.O. BOX 31, ROYAL OAK, MICHIGAN

For more data circle 279 on Reader Service Card

LOSING BUSINESS
because of
screw machine
PRODUCTION
COSTS?



GET COMPETITIVE with the
LiPe Automatic Magazine-Loading BAR FEED!



A.M.L. Produces 30% to 100% More Output by Eliminating Time Losses!

- Automatically feeds bar stock to screw machine.
- Feeds stock to screw machine continuously, independently of operator.
- Cuts cycle time: guaranteed to attain at least 90% of machine's gross geared production capacity.
- Eliminates feed fingers . . . multiple feed finger feed-outs . . . feed finger adjustments and replacements. No jamming of remnants.
- No cutting air. No minimum or maximum run. No limit on length of feed. No selective stock length requirement.

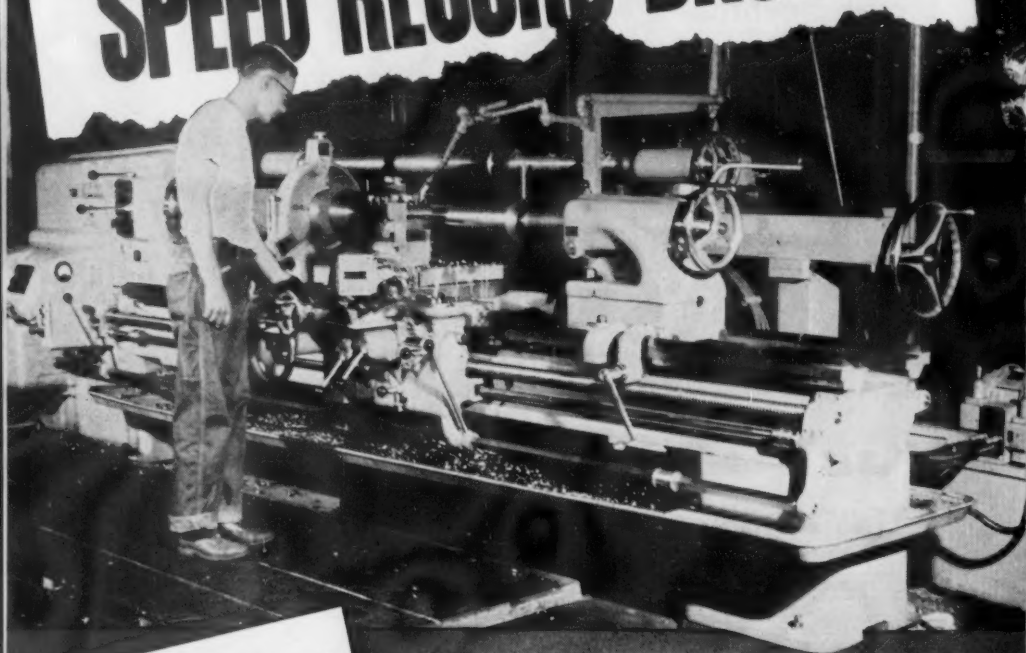
• For full details on the LiPe A.M.L. Bar Feed, send for literature and name of nearest distributor.



LiPe-ROLLWAY
CORPORATION
SYRACUSE 1, N. Y.

Manufacturers of Automotive Clutches & Machine Tools

SPEED RECORD BROKEN



**2,000 Horse Power
Motor Shafts
ROUGH and
FINISHED in
2¼ hrs.**

**Former Time
9 hours**

Fairbanks, Morse & Co., Beloit, Wisconsin, is getting this amazing production day after day on its 20 inch "AMERICAN" All-hydraulic Duplicating Lathe.

These shafts are made from 7½" diameter by 84" long hot rolled stock weighing 1059 pounds. A 30 horse power roughing cut and 15 to 20 horse power finishing cut completes the operation.

Note particularly that a finish turned motor shaft is used for a template, showing the rugged stability of "AMERICAN" Template Supports.

The quality of Fairbanks-Morse's products are universally recognized. We are proud indeed that so many "AMERICAN" Lathes and Radial Drills contribute to them. "AMERICAN" Hydraulic Duplicating Lathes hold many production records for work of this nature. Let us show you what they will do on your work.

Send for Bulletin No. 35.

THE AMERICAN TOOL WORKS CO.

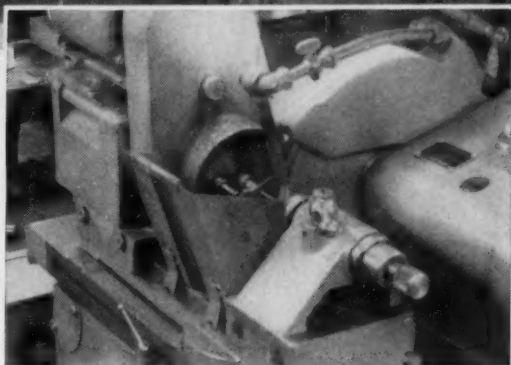
Cincinnati 2, Ohio, U. S. A.

High Precision Production Here



ARTER

*Using diamond wheel
to grind O.D. of a solid
carbide 1/16" diameter
end mill — dead center
work head used.*



Twelve of a battery of twenty-four Arter Model 103 cylindrical grinders in the highly modern plant of The Atrax Company, Newington, Conn. This nationally known progressive company produces precision ground carbide tools — end mills,

reamers, drills, grinding tools, burs, bur mills, boring tools and boring bits. Atrax also has some of these versatile Arters set up for internal grinding. Whether you have external cylindrical or internal grinding, it will pay you to look into this grinder.

ARTER GRINDING MACHINE COMPANY

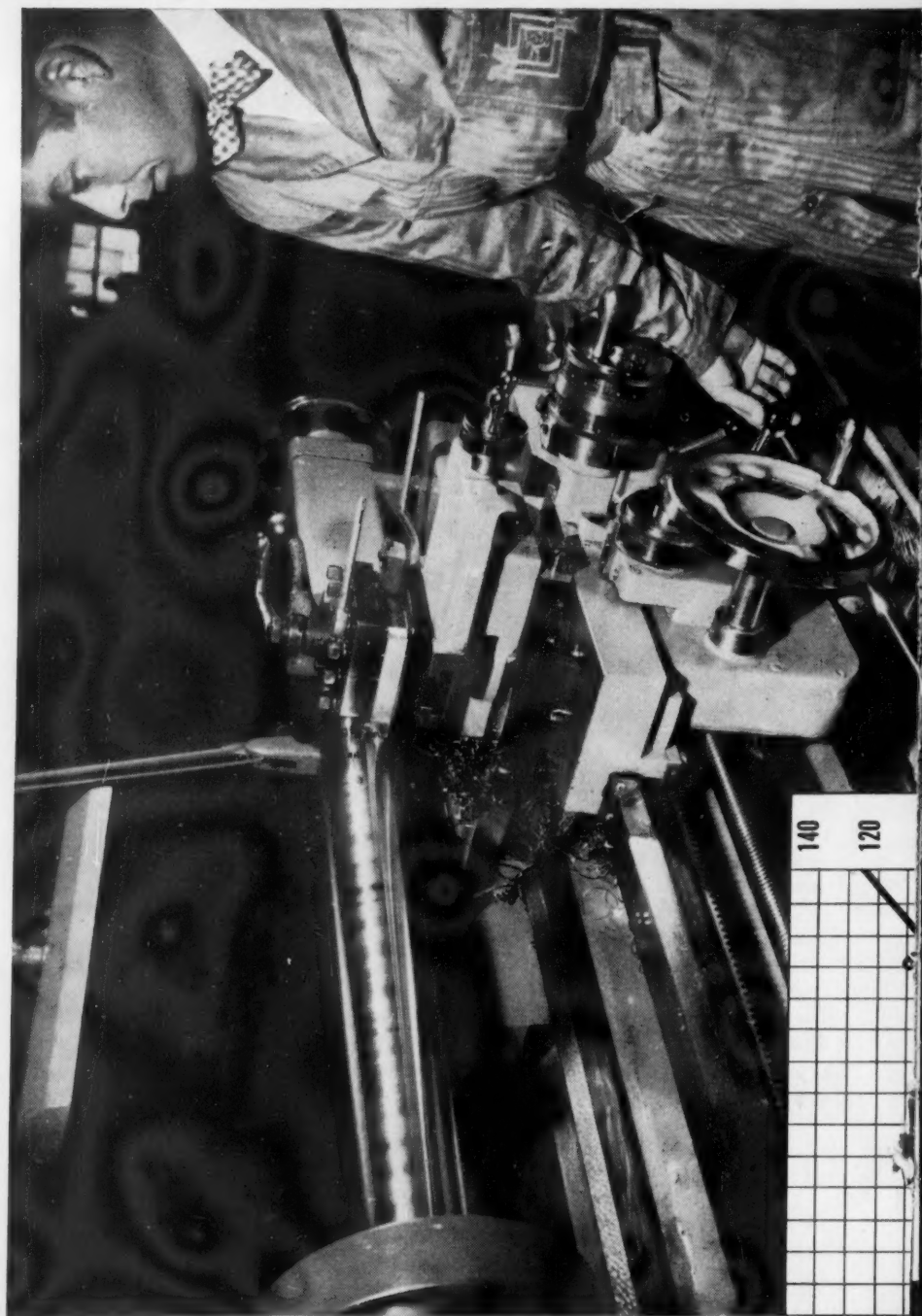
WORCESTER 5, MASSACHUSETTS

Jigmatic Automatic Tape Controlled Positioning Table • Rotary Surface Grinders
Flat Circular Cutter Grinders • Internal Grinders • Cylindrical Grinders • Carbide Tool Grinders
AGENTS IN INDUSTRIAL CENTERS OF UNITED STATES AND CANADA

For more data circle 282 on Reader Service Card

July, 1956

modern machine shop 83



Lathe Shaft production **UP 40%** with new Firthite TXH Carbide

Wherever used, *new* FIRTHITE TXH Carbide is proving its competitive superiority . . . as at Boyé & Emmes Machine Tool Company, Cincinnati, for turning lathe shafts from 3 inch SAE 4140 un-annealed steel.

Here's what they found:

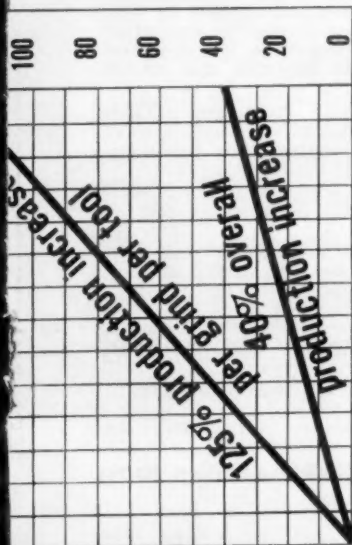
- Overall production went up 40%.
- Production increase of 125% per grind per tool.
- Twelve shafts per tool without regrinding.
- Only .0010 flank wear in 12 cuts.

Impressive? You bet! So much so that many tool engineers have acclaimed TXH as the most nearly "universal" grade of carbide yet developed. That's because TXH is an entirely new concept in carbide metallurgy . . . a combination of materials and processes designed specifically to do heavy-duty, high-production cutting operations better than they have ever been done before. And while a distinctly *premium grade*, TXH is not *premium priced!*

You try it. It's available from stock in all standard tips, tools and inserts.

TXH ADVANTAGES

- Higher hardness to strength ratio
- Improved impact resistance
- Wider range of applications
- Lower operating temperatures
- Higher edge strength
- Greater resistance to abrasion



Firth Sterling

—INC—

GENERAL OFFICES: 3113 FORBES ST., PITTSBURGH 30, PA.

MILLS: MCKEESPORT, TRAFFORD, DETROIT, HOUSTON

OFFICES AND WAREHOUSES: BIRMINGHAM CHICAGO* CLEVELAND* DAYTON DETROIT* HARTFORD* HOUSTON LOS ANGELES* PITTSBURGH WESTFIELD, N. J.

R-317

PRODUCTS OF FIRTH STERLING METALLURGY

High Speed Steels

Tool & Die Steels

Stainless Specialties

High Temperature Alloys



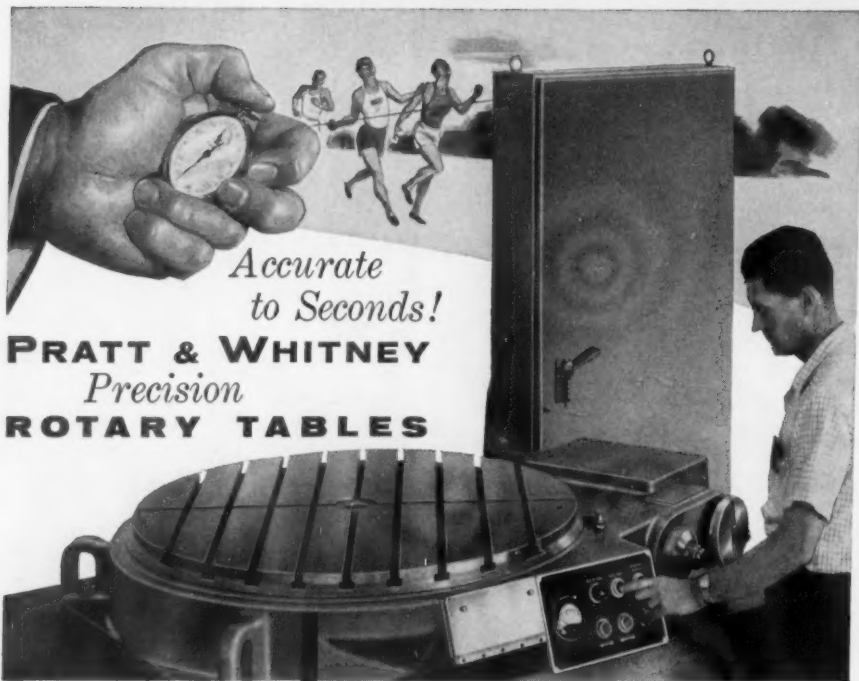
Sintered Tungsten Carbides

Firth Heavy Metal

Chromium Carbides

High Temperature Cermet

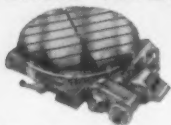
Zirconium



*Accurate
to Seconds!*

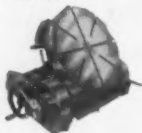
PRATT & WHITNEY
Precision
ROTARY TABLES

3 BASIC TYPES



PLAIN

Hand: 12" and 20" dia. Motor-Driven: 24" to 50".



TILTING

10" to 36" dia.



VERTICAL

Motor-Driven: 30" and 48" dia.

Like the timer's stop watch, Pratt & Whitney Rotary Tables are *accurate to seconds* . . . seconds of arc, that is! Built for ruggedness and stamina as well, they'll help you eliminate expensive jigs and set-up changes on difficult, precise machining jobs year after year. Ideal, too, for reliable inspection and circular indexing.

Featured here is the new 42" Plain Rotary Table WITH AUTOMATIC INDEXING. Work is automatically positioned to any desired angle. Initial and repeat settings are equally accurate.

Now, Pratt & Whitney Rotary Tables can be furnished with indexing control by NUMERICAL DATA.

WRITE FOR COMPLETE INFORMATION

. . . ask for illustrated circulars fully describing P&W Precision Rotary Tables.



PRATT & WHITNEY COMPANY
INCORPORATED

25 Charter Oak Boulevard, West Hartford, Conn.

Direct Factory Representatives in Principal Cities

MACHINE TOOLS • GAGES • CUTTING TOOLS

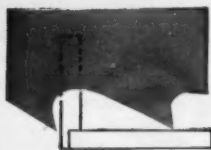
For more data circle 285 on Reader Service Card

NEW *Hook-Tooth*

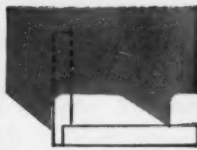
LENOX HOOK-TOOTH BAND SAW BLADES

**With Positive Rake and Rounded Gullets
Cuts Faster, Freer . . . Lasts Longer
For Non-ferrous Metals, Wood, Plastics**

Hook-Tooth



**Conventional
Blade**



Hook-Tooth Blade with a *positive rake*. Teeth hook themselves into the work. They saw instead of scraping and they cut full helical chips.

Cuts Faster

The positive rake teeth incline toward the work for quicker penetration and faster cutting.

Cuts Freer

Hook-Tooth digs in and takes big full chips from the material. Rounded gullets allow the chips to form and clear with ease.

Lasts Longer

Hook-Tooth meets less resistance, generates less friction and heat. So, Hook-Tooth lasts longer and gives more cuts per blade.

Costs Less

Anyway you look at it—in terms of greater production, lower blade costs, less man-hours, fewer machines—it all adds up to real savings with LENOX Hook-Tooth Band Saw Blades.

**AMERICAN SAW & MFG. COMPANY
SPRINGFIELD, MASS.**

Tough grinding jobs?

Check ***Vulcanaire***
high speed precision
grinding heads!

Many seemingly impossible grinding problems have been solved by adapting Vulcanaire to standard machines or by using one of Vulcan's specially designed machines.

On Surface Grinders, merely remove wheel and guard, clamp vertical or horizontal adaptor to machine as illustrated. No belts necessary. For instance, Vulcanaire used in connection with Vulcan's Rotary Table for Surface Grinders permits the grinding of a circular slot.

Adaptors are in stock to fit the spindle of Vertical Milling Machines for grinding contours, holes and slots.

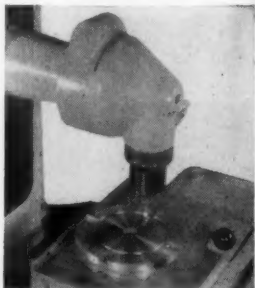
On Internal Grinding Machines Vulcanaire's infinitely controlled speeds furnish the correct surface cutting speed resulting in faster production and micro finish. The adaptor sleeve fits into present housing.

Applied to Jig Boring Machines, Vulcanaire is liked by leading precision manufacturers because its accuracy is guaranteed, producing Vulcanaire jig grinding of large and small parts.

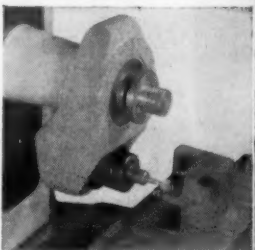
Send us a blue print on your toughest grinding problem. Recommendations and sketches will be returned to you — no obligation.



Grinding circular slot using Vulcan's Rotary Table and Magnetic chuck.



Vertical adaptor for Surface Grinders. Grinding small slots



Horizontal application Grinding a Shoulder Punch.

Major Vulcan Services

Engineering, Processing, Designing and Building . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and size. Vulcanaire Jig Grinders . . . Motorized Rotary Tables . . . Plastic Tooling.

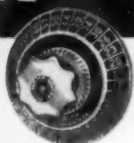
VULCAN TOOL CO. •

710 LORAIN, DAYTON 10, OHIO

SIDNEY

DIAL-MASTER

LATHE
MODEL 32



SIDNEY'S LATEST TRIUMPH IN MODERN TURNING

The proved and approved answer to industry's demand for a turning tool which answers practically every requirement for *fast, economical precision production.*



Also available with THE SIDNEY FLUID TRACER ATTACHMENT which provides tremendous savings in cost per finished piece on small or quantity runs. Tracer motor may be turned off while the machine is performing standard lathe work.

DIAL-MASTER offers:

- DIAL CONTROL — 32 pre-selective spindle speeds
- Increased capacity • Added rigidity
- Increased size spindle diameter, tailstock, apron and carriage and bed design
- Simplified feed and thread control arrangement
- Single operational apron control lever for feed and quick traverse in four directions for maximum convenience of operator
- Complete range of 60 thread and feed changes



Write for new bulletins or ask for representative to call at your convenience

THE SIDNEY MACHINE TOOL CO.

Builders of Precision Machinery since 1904

Sidney, Ohio

For more data circle 288 on Reader Service Card

July, 1956

modern machine shop 89



Solve Bearing Space Limitation Problems

WITH

NORMA-HOFFMANN

EXTRA LIGHT

XLS Series Precision Bearings

Advantages

- Have unusually large bores compared to outside diameter
- Provide utmost in accuracy, rigidity, and load capacity — (radial and thrust)
- Are compact, light in weight
- Allow greater freedom in design. In many cases these bearings provide the only solution where space is at a premium.

Norma-Hoffmann "XLS" Extra Light Inch Series Ball Bearings provide engineers and designers the advantage of high anti-friction performance plus space saving. They are ideal for hollow shafts.

These bearings are self-contained, non-separable and are suitable for combined radial and thrust loads in either direction. They are available in sizes from 1 1/4" to 22 1/2" bore. Our Field Engineers will gladly help you with your bearing problems. Write for their assistance and catalog.

NORMA-HOFFMANN
Precision
BEARINGS

BALL • ROLLER • THRUST

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The Empire Floating Tool Holder automatically compensates for BOTH angular and parallel misalignment. Sleeve and shank float independently of each other . . . achieving a free and easy movement . . . exclusive with Empire. Amount of float is infinitely adjustable. Minimum maintenance—holder has only five parts. Moving parts ride on rollers for smoother running with perfect alignment . . . and anti-friction of members. Bell mouths and over-sized holes eliminated, allowing for extremely close tolerance work.

Taps float IN and OUT with the Empire Floating Tap Holder. Designed to prevent freezing under tension caused by drag on the tap. Automatically corrects parallel and angular misalignment. Simple adjustment of locknut provides accurate control of wide range of float. Flotation makes close tolerances easy to hold. No spring or pivot members to restrict float. Available with straight or tapered shanks.

EMPIRE TOOL COMPANY

8774 GRINNELL AVE.

• DETROIT 13, MICHIGAN

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July, 1956

modern machine shop 91

OVER THE EDITOR'S DESK . . .



IN NINETEEN MINUTES PLUS

According to a recent study, the average manufacturing company spends most of the working day paying off the costs of doing business, and only $19\frac{1}{4}$ minutes are left in which to earn profits. In the normal working day, $19\frac{1}{4}$ minutes are a pretty small part. It is close to quitting time before these few minutes, all that is left of the day, are "minutes for profit," in the average manufacturing company.

Only about one half of the $19\frac{1}{4}$ minutes result in dividend for the owners. The rest of the profit minutes are used for reinvestment in the business.

Three hours and 55 minutes are used to pay for materials and supplies. Assuming the working day begins at 8 A. M., that takes until 11:55. To meet wages and salaries takes two hours and 19 minutes. With one hour for lunch, the clock moves to 3:14.

To pay all taxes, federal, state and local, uses up another $43\frac{1}{4}$ minutes. It is 3:57 $\frac{1}{4}$. Repair and replacement of facilities will require 29 minutes. For research and promotion, $14\frac{1}{2}$ minutes more are used up. By now it is $19\frac{1}{4}$ minutes before the day

ends, at 5 P. M. In this short time, the company must earn the profits it must make in order to stay in business.

★ ★ ★

TO REMEMBER

During the next few months of this important political year, when the contenders for political office begin to give out with the promises, it will be well to remember that the government can give you nothing except what was taken away from you in the first place.

★ ★ ★

RAILROAD SPENDING

Eastern railroads spent a total of \$330 million for capital expenditures in 1955, an increase of 32.5 percent over the previous year's expenditure of \$249 million, according to the 1956 edition of the Yearbook of Railroad Information, just published by the Eastern Railroad Presidents Conference.

For the nation as a whole, railroad capital expenditures amounted to \$908 million in 1955, compared with \$820 million in 1954. On a nationwide basis, \$568 million was spent for equipment and \$340 mil-

FOUND WHERE FINE BUSINESS MACHINES ARE "BORN"

GRAND RAPIDS GRINDERS

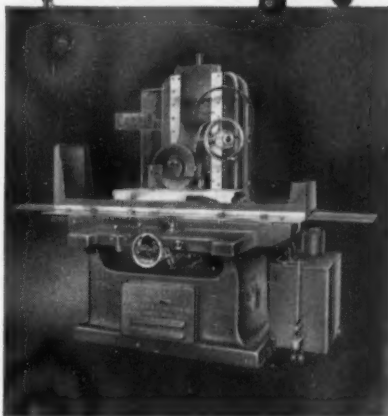


INTERNATIONAL BUSINESS MACHINES

Producing an intricate business machine requires exceptional tool-room precision. That's why these manufacturers use Grand Rapids Grinders . . . engineered to achieve extraordinary grinding precision at cost-cutting speed.

Model No. 55, at right, offers such features as one-piece column and base for permanent, vibrationless alignment, wheel head with powered rapid vertical travel, hydraulically actuated cross feed and longitudinal travel table. And it's the fastest grinder of its size and type, with a variable table speed up to 125 fpm!

Whether you make business machines or bulldozers, you can count on Grand Rapids Grinders for maximum toolroom precision.



GRAND RAPIDS NO. 55 HYDRAULIC FEED SURFACE GRINDER. Table speed up to 125 fpm. Working surface of table is 12" x 36". Vertical movement of wheel head is 18". Preloaded ball bearing spindle greased for life. Spindle speed 1925 and 2500 rpm.

A note on your letterhead will bring complete details.



SMITH CORONA



COMPTOMETER



REMINGTON RAND



UNDERWOOD



R. C. ALLEN



GALLMEYER & LIVINGSTON COMPANY

408 Straight Ave., S.W., Grand Rapids, Michigan

July, 1956

modern machine shop 93



lion for roadway and structures in 1955. In the Eastern district, equipment expenditures amounted to \$202 million and roadway and structures spending to \$128 million.

★ ★ ★

SUPERVISORY SECURITY

In collecting material for a new supervisory training program package, which now in completed form consists of two sound motion pictures, five film clips, four booklets, and a complete-to-the-last-detail conference leader's guide, The Mutual Benefit Life Insurance Company, Newark, New Jersey, surveyed some five hundred companies. Lack of initiative, Mutual discovered, ranks as management's biggest problem.

The first big piece of the program, therefore, is a 20-minute motion picture film entitled "The Time Is Now." Using a very human approach, it shows how a supervisor discovers that his true security comes more from what he is than from what he has . . . that his inner assets are his source of strength for meeting crises or taking advantage of opportunities.

★ ★ ★

PRODUCTIVITY

The headline in an advertisement appearing in one of the British industrial magazines reads "PRODUCTIVITY or the ANT and the

Elephant." The copy of the ad then reads as follows: "If there were factors of productivity in Nature, they would seem to indicate an inverse ratio to size. The White Ant, for example, that great builder of towers fifteen to twenty feet high, reproduces at the rate of 83,000 per day and her castles are used for brickmaking by man. The Elephant calves once in about seven years, and she builds nothing.

"But, factors can be misleading, for the total weight of the Elephant's reproduction is probably many times that of the White Ant, and its greatest longevity is beyond dispute. At opposite ends of the scale, nature apparently favors either rapidity of turn out or durability of goods; whereas industry expects a combination of both quality and quantity."

★ ★ ★

AUTO COSTS

Recently the producers of the internationally known Volkswagon announced that they had purchased a former Studebaker plant in New Brunswick, New Jersey, in order that they might have a place in which to build their famous car in the United States. But plans were cancelled when experts calculated that because American costs were so high, it would actually be cheaper to build the car in Germany and ship it to the United States (incurring freight charges of about \$95 and import duties of \$113 per unit) than it would be to build the car here.

This raises an interesting question for our automobile workers and builders. Could high costs price the American made automobile out of

"Home-made" Automatic Drill set-up cuts drilling costs from 2¢ to 1/10¢ per piece

Two standard Dumore Automatic Drill Units plus low cost tooling boost production for midwest die cast firm.

When Acme Die Casting Corp., Racine, Wisc., bid on a die cast zinc automobile door lock, their price hinged on maintaining high production rates on every phase of the operation. However, when hand drilling two opposed .160" holes, they found it impossible to hold the necessary .002" alignment tolerances as well as maintain the required high hourly production. They began looking for a solution.

Uses Dumore Advisory Service

Working closely with Dumore's Application Advisory Service, the company devised the special purpose machine pictured below. It consists of two Dumore Series 24 Automatic Drill Units designed into a completely automatic set-up that amounted to only a few hundred dollars in tooling and fixture costs. Complete synchronization of stroke, feed and drilling is made possible with effective use of micro-switches.

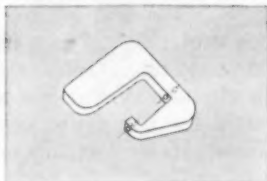
From 150 to 1500 pieces per hour

By increasing production from 150 to 1500 pieces per hour, drilling costs were reduced from 2¢ to 1/10¢ per piece. Operating at three shifts per day, the Dumore Units and tooling paid for themselves within a matter of weeks.



AN INEXPERIENCED OPERATOR loads the hopper while gravity feed forces the piece into the drilling fixture. The two opposed Dumore Automatic Drill Units advance simultaneously, drill, then retract to starting position—all automatically. The Dumore's built-in electrical and pneumatic controls permit almost unlimited set-up and production possibilities.

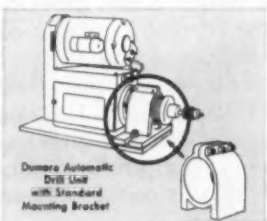
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PART: Zinc Die Cast Automobile Door Lock.

OPERATION: Drill two opposed .160" holes, hold alignment within .002", parallelism .0015".

PRODUCTION: 1500 pieces per hour, or 25 per minute.



QUICK REMOVAL and transfer of Dumore Units to other parts of the shop for drilling, tapping, reaming and other related operations is made possible with their unique nose mounting bracket. Quickly adapts Unit at any angle to existing shop equipment.

Let Dumore's Application Advisory Service help **YOU** get increased production and lower costs on jobs like this. Write for **FREE** Dumore Application Analysis Kit.

DUMORE

PRECISION TOOLS



**AUTOMATIC
DRILL UNITS
TOOL POST and
HAND GRINDERS**

1302 Seventeenth St., Racine, Wis.



our own market? If a major American auto manufacturer were to move production operations to Germany, could the company successfully undersell its competitors on the American market?

★ ★ ★

BRIGHT PROSPECTS

The manufacture of machinery, hitherto regarded as a hazardous and extremely volatile business, has taken on a new glow in the light of the current capital goods boom, according to the Value Line Investment Survey, published by Arnold Bernhard & Co. Backlogs are generally at record high levels; shipments are rising; profit margins are not so ample as could be desired, but improving.

The Value Line Report points out that our continued economic well-being depends in large measure upon the manufacture of more tools of production, the gradual expansion of our technological know-how to provide more goods for more people. It cautions, however, that the demand and need for capital equipment is by its very nature changing and uncertain. Our economic expansion has in the past occurred in waves, the intensity of which has been greatly magnified for the capital goods producer. "New Era" and government control theories notwithstanding, there are as yet no convincing grounds for expecting this pattern to change suddenly."

INVENTED ANYTHING LATELY?

In his book "How To Find A Buyer For Your Invention," V. D. Angerman gives a goodly amount of practical advice for the novice on the matter of marketing patented or unpatented inventions. The book covers essential detail in capitalizing on inventive skill; how to make contacts; eight ways to sell inventions. It lists needed inventions, catalogs materials, equipment and processes, consulting and development sources and keys each item to appropriate firms.

Included is a roster of manufacturers which gives name and address, the official to query, and brief statement in company's own words regarding interest in promoting specific types of new products. Copies of the book at \$2.95 each can be obtained from S & W Publishing Company, 450 E. Ohio Street, Chicago 11, Illinois.

★ ★ ★

INFLATIONARY FORCE

The United States stands today at an economic cross-roads and must decide whether to take the road leading to continuous inflation or to go straight ahead on the super-highway of orderly growth, according to Dr. Ralph Robey, economic adviser to the National Association of Manufacturers. A choice must be made because a new inflationary force threatens the economic well being of the nation.

Unwarranted wage increases, exceeding labor's reasonable share in the gains of productivity will force an increase in the money supply beyond that required by normal eco-

Scully-Jones

PREMIUM QUALITY SLEEVES, SOCKETS

now even better!

New "keyhole-type" drift slot eliminates the need for hammering on conventional drift and speeds tool ejection.

These benefits...	for these reasons	...result from these PREMIUM features
INCREASED ACCURACY	Run true in the machine spindle	1. Precision-finished to high degree of concentricity.
		2. Hardened surfaces resist nicking and burring.
INCREASED PRODUCTION	Faster tool changes	3. Properly hardened and precision-ground surfaces assure perfect fit in spindle.
	Guard against cutting tool breakage	4. New "keyhole-type" drift slot simplifies ejection of chucks and tools—eliminates pounding.
	Longer tool life	5. Outlast several soft sleeves or sockets—proper steel and hardness prevent twisting, nicking, and spindle damage.
REDUCED TOOL COSTS	Adapt your present machines and cutting tools for wide range of operations	6. Convert any Morse Taper hole and shank to a smaller or larger taper.
		7. Three series of sockets and turret tool holders reach otherwise inaccessible machining locations.

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JONES**

Call your Scully-Jones factory-trained representative or distributor for complete information and prices.

PRECISION HOLDING TOOLS
"Precision Holding" for holding precision

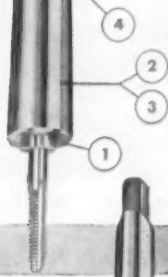
Scully-Jones and Company, 1909 South Rockwell St., Chicago 8, Ill.

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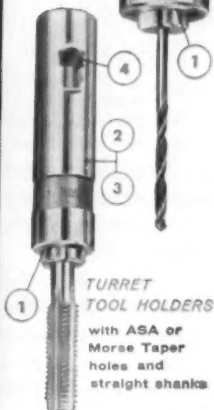
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PRECISION SLEEVES
Style 100-D
with ASA or Morse Tapers



EXTENSION SOCKETS
Style 100-W
with ASA or Morse Tapers



TURRET TOOL HOLDERS
with ASA or Morse Taper
holes and
straight shanks



conomic growth and will start the nation again on the road to inflation. If this danger is to be avoided, wage increases must be restricted company by company to increases in productivity. In brief, gains in productivity should be divided three ways: to labor for its increased efficiency, to investors for the more effective tools and machines their savings provide, and to consumers through price reductions of the products which are being produced with these improved tools.

★ ★ ★

Letters to the Editor:

Machining Economics

We were very much interested in the article "Machining Economics" which appeared on page 104 of the May issue. If you should put out reprints of this article, we would like to receive six copies for use in our teaching program here.

W. H. Armstrong, Associate Professor
Industrial Engineering
The Pennsylvania State University
University Park, Pennsylvania

● *Six copies of article requested being sent under separate cover. Anyone else desiring copies, just let us know.—Ed.*

Production with Safety

In the April issue of *Modern Machine Shop*, page 104 and those that follow, you had an article on safety in punch press operations. It was

written by Dan F. Brady, Manager of Safety for The Maytag Company.

Could you be kind enough to tell me in what plant of this company the pictures were taken. Your kind cooperation will be appreciated.

F. L. Engstrom, Manager
A. Schrader's Son
Brooklyn 38, New York

● *Information obtained from Mr. Brady indicates that all photos appearing in the story were taken in the Newton, Iowa plant of the company.—Ed.*

Stamping Film

Regarding the movie film on stamping operations recently mentioned in an issue of *Modern Machine Shop*, could we obtain from you or the John Volkert organization more information as to the loan and use of the film for our company employees (100) at some future date?

John J. Taroli, Foreman
Safe Flight Instrument Corporation
4 Water Street
White Plains, New York

● *Arrangements for loan and use of film can be made by writing directly to John Volkert Metal Stampings, Inc., Queens Village, N. Y.—Ed.*

Personnel Conferences

I enjoyed very much reading the thought-provoking article entitled "Personnel Conferences for Executives" which appeared on page 142 of your May issue and, if possible would appreciate receiving a reprint of this article for my files.

M. R. Bowerman, Director of Research
The Alliance Machine Company
Alliance, Ohio

announcing the new WELDON CATALOG NO. 11

Size 8 1/2" x 11"

A Unique Improved Idea In A Tool Catalog That Makes
Selecting Tools Simple, Easy and Confusion-Free . . .

Contains a Complete Listing of

WELDON END MILLS

END MILL HOLDERS

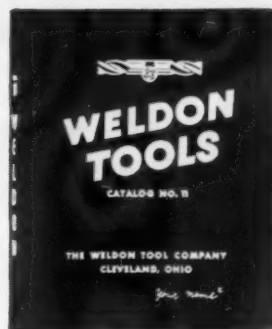
TU-LIP COUNTERBORES

NEW TYPE COUNTERSINKS
and DEBURRING TOOLS

ANGULAR CUTTERS

SHARPENING FIXTURES

HIGH SPEED STEEL and
CARBIDE FORM TOOLS



4 FLUTES OR MORE

END MILLS
HIGH SPEED STEEL
HOLLOW GROUND FLUTES
AND DOUBLE BACKS

Unless otherwise specified R. H. Mills will be furnished.

Order by this No.	Diam. of Mill	Diam. of Shank	Length of Flutes	No. of Flutes	Whole Length
A72-3	11/16	1/2	1-5/8	4	3-5/8
A23-4	11/16	5/8	1-5/8	4	3-3/4
AA36-5	3/4	3/4	1-5/8	4	5-5/8
A26-3	3/4	1/2	1-5/8	4	3-5/8
A24-4	3/4	5/8	1-5/8	4	3-3/4
A26-5A	3/4	3/4	1-5/8	4	3-7/8
ASB-24	3/4	3/4	1-1/4	4	2-3/4
AL24-5	1/2	1/2	1-5/8	4	3-5/8

Order by this No.

Diam. of Mill	Diam. of Shank	Length of Flutes	No. of Flutes	Whole Length	
AA28-6	7/8	7/8	1-7/8	4	6-1/8
A28-4	7/8	5/8	1-7/8	6	4
A28-5A	7/8	5/8	1-7/8	4	4-1/8
A28-6	7/8	7/8	1-7/8	4	4-1/8
AL28-6	7/8	7/8	1-7/8	4	4-1/8

Unless otherwise specified

END MILL
HIGH SPEED
HOLLOW GROUND
AND DOUBLE BACK

WELDON

A unique new idea in a tool catalog is presented by the Weldon Tool Company, the oldest and largest producer of modern type End Mills, End Mill Holders and Allied Products. The distinct feature of Catalog No. 11 is the progressive listing of tools by sizes, complete with detailed dimensions —an arrangement that will be instantly recognized as a helpful, easy and simple aid in selecting tools with a minimum of confusion.

If you have not already received Catalog No. 11, please contact your Weldon Distributor. If you prefer, write us for a copy, sending your name and company address.

* You can PERSONALIZE your catalog with your name in gold (Foil furnished).

THE WELDON TOOL COMPANY



3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO

YESTERDAY'S PIONEER . . .

TODAY'S LEADER



Punch and Die Catalog

We would like to know the name of the firm that makes piercing punches and dies which very recently announced the availability of a new catalog. Better still, it would save time if you were to ask them to send us their catalog.

R. Beaver, Owner
Rudolph Beaver
Waltham 54, Mass.

● *Your request has been forwarded to R. J. Wilds, Assistant Sales Manager, Richards Brothers Punch Division, 26500 Capitol Avenue, Detroit 39, Michigan.—Ed.*

Metrology Laboratory

One of our engineers is interested in the article entitled "Metrology Laboratory" which appeared on pages 132 through 135 of the April issue. We would appreciate your sending us tear sheets or reprints of the article, if available.

C. S. Iden
Manufacturing Research Department
International Harvester Company
5225 S. Western Blvd.
Chicago 9, Illinois

Kindly Advise

Please give us the names and addresses of manufacturers of thread indicators for lathes operating from lead screw.

E. Crabtree, President
Dominion Welders & Machinery Limited
322 Lumsden Avenue
Toronto 13, Canada

Could you please help me and let me know where I can find information on the so-called Guerin process, the stamping process that uses a solid punch and a rubber cushion as a die.

James C. Diefenbach, Vice-President
Simmon Brothers, Inc.
30-28 Starr Avenue
Long Island City 1, N. Y.

Kindly advise if you can refer us to a firm who manufactures a laboratory size metal shaver that can be used to shave off the face or back of metal type with an accuracy of .0005 inch.

H. Stillman & Associates
670 N. Michigan Avenue
Chicago, Illinois

Please advise us if four tear sheets of page 130 of your May issue may be made available to us.

Frank Murphy, Vice-President
Calco Machinery Co.
3701 N. Broad Street
Philadelphia 40, Pa.

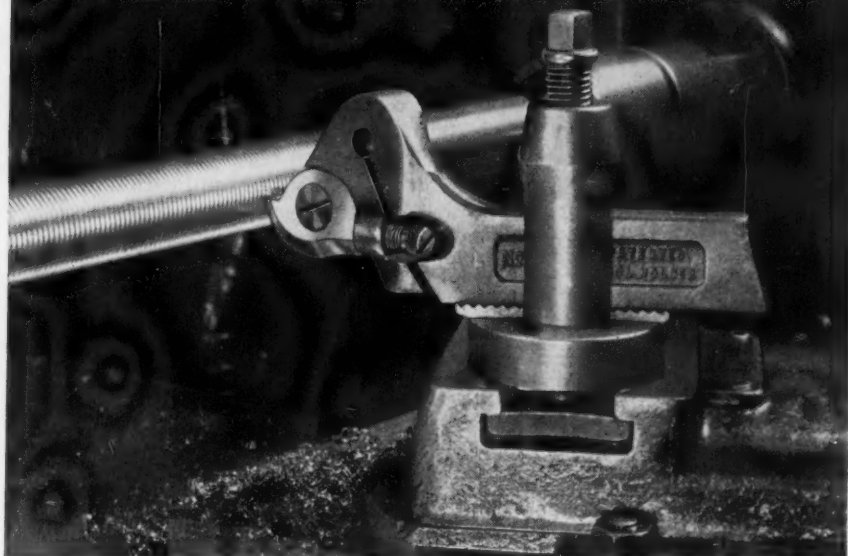
Would you be kind enough to furnish the undersigned with reprints of your articles "How to Make and Repair Epoxy Dies" and copy of "How Good a Boss Are You?"

John A. Cochrane, Vice-President
Jordan Refrigerator Company
7900 Tabor Road
Philadelphia 11, Pa.

Can you give us the name and address of a shop that does metal spinning on a custom or commercial basis?

George F. Witmar, Owner
Marine Shop
Drawer 181
St. Augustine, Florida

ARMSTRONG



The ARMSTRONG Threading Tool takes interchangeable high speed steel form-cutters which require only flat top grinding to resharpen—always hold their true thread form.

Each year ARMSTRONG TOOL HOLDERS become more important to you

Every rise in labor costs, every added tax, every overhead burden, every increase in cutting steel prices, every new, more costly machine tool, all increase the importance of ARMSTRONG TOOL HOLDERS to profitable operation.

ARMSTRONG TOOL HOLDERS reduce direct tooling costs to an absolute minimum—"Saves: All Forging, 70% Grinding, 90% High Speed Steel."

ARMSTRONG TOOL HOLDERS reduce tooling-up time to minutes, to the selection and adjustment of the holder and cutter.

ARMSTRONG TOOL HOLDERS permit increased speeds and feeds—produce more pieces per hour per machine tool.

ARMSTRONG TOOL HOLDERS are efficient for they embody a perfection gained by over 50 years of specialization in the development and refinement of tool holders.

ARMSTRONG TOOL HOLDERS are inexpensive because they are quantity produced by modern methods, for a world market... are used by over 96% of the machine shops and tool rooms... are carried in stock for your convenience by all industrial distributors of consequence.

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TOOLS from your
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July, 1956

modern machine shop 101

FEATURES IN

ESSENTIAL ELEMENTS OF THREAD AND FORM ROLLING

By Clifford T. Appleton

In this first installment of a three-part article, the author points out the advantages and characteristics of rolled threads, the versatility of application of the thread rolling process and the different types of equipment available for the process. Page 104.

SWINGING BOLTS AND CLAMPS

By Fred Rogers

In concluding his discussion of swinging bolts and clamps, the author directs his attention to the swinging bolt as applied to several specific designs of clamping arrangements. (The first part of this article was published in last month's issue.) Page 110.

SURFACE GRINDING INSERTED-TOOTH REAMER BLADES

By John E. Hyler

At the Machine and Small Tools Division, Barber-Colman Company, Rockford, Illinois, a Mattison vertical-spindle rotary-chuck unit is used for the close-tolerance high production grinding of inserted-tooth reamer blades. Page 118.

AUTOMATICALLY CONTROLLING MACHINE OPERATIONS

By Gilbert C. Close

According to the text of this article, a control tape, produced on a planning desk in one city, could be duplicated by telephone anywhere in the world, placed in a machine control unit and production of the part immediately started. Page 120.

**JULY
1956**

THIS ISSUE

CEMENTED OXIDE TOOLS INCREASE LATHE SPINDLE PRODUCTION

The R. K. LeBlond Machine Tool Company, Cincinnati, Ohio, utilizes a new cutting tool material in making a 12-step cut with only one cutting tool along 29 inches of a 31-inch lathe spindle. Page 126.

GLOSSARY OF PRECISION MEASUREMENT

By Charles G. Noble

Designed to meet the need for a standard nomenclature to be used throughout industry, the definitions contained in this glossary were prepared by the Eli Whitney Metrology Laboratory of The Sheffield Corporation, which was established to provide private industry with precise measurement facilities comparable to those of the world's leading government standards laboratories. Page 128.

DESIGNING FOR PROFIT

Based on one of the Lincoln Arc Welding Foundation's recent award papers, this article explains how a cutter grinder base was redesigned to provide for savings in construction, as well as a more attractive appearance. Page 136.

VISUALIZING PLANT LAYOUT IN THREE DIMENSIONS

By H. H. Dasey

Additional suggestions for saving time and money through efficient layout planning are presented in this concluding installment of a two-part article. (See last month's issue of this magazine for the first part of the article.) Page 142.

VOL. 29

NO. 2



ESSENTIAL ELEMENTS OF

Thread and Form

In this first installment of a three-part article, the author points out the advantages and characteristics of rolled threads, versatility of application of the thread rolling process and types of equipment available for the process.

By CLIFFORD T. APPLETON

Vice President, Reed Rolled Thread
Die Company

Although widespread knowledge of thread rolling is fairly recent, the process itself is not new. Records indicate that it was first demonstrated early in the 19th Century. Patent Office files show that many different people worked on its development and most of its fundamentals were known nearly 100 years ago.

It was not, however, used in regular production until the late 1800's

and its use from then until the early 1940's was confined almost entirely to the fastener industry. Thread rolling came into more general use about the time the United States entered World War II, and during the war the aircraft industry specified thread rolling as a preferred method of producing precise threads such as those of Classes 4 and 5.

The fastener industry was one of

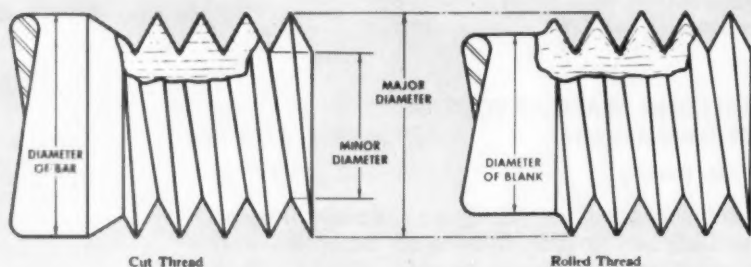


Fig. 1—Drawing showing a comparison of a cut thread and a rolled thread.

Rolling

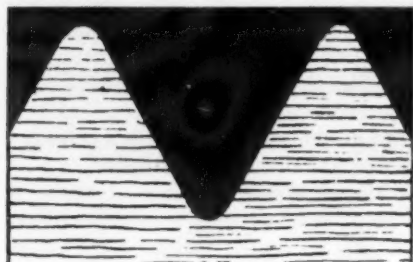
the first to appreciate its advantages and has used the thread rolling process profitably for many years. More recently, users of other threaded products have recognized the advantages of rolled threads and have specified thread rolling as a preferred and economical method of producing uniform, smooth, precise threads. Today it is interesting to note that estimates show that two-thirds of the external threading capacity in the United States is devoted to thread rolling.

Thread rolling is a simple cold-forging process confined almost entirely to external threads. Hardened steel dies are used to roll the threads. The threaded faces of these dies are pressed against the periphery of a plain cylindrical blank and reform the surface of the blank into threads as the blank rolls on

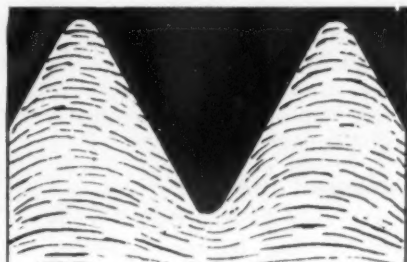
About the Author



CLIFFORD T. APPLETON, Vice President, Reed Rolled Thread Die Co., Worcester, Mass., is a graduated Mechanical Engineer from the School of Engineering of Pratt Institute in Brooklyn, New York. He has been closely allied with the machine and small tool industries in various capacities, including engineering, manufacturing and sales. Mr. Appleton joined the Reed organization in 1944, and since that time he has been closely associated with the development and application of the thread rolling process.



Cut Thread



Roller Thread

Fig. 2—Illustration showing grain flow of a cut thread and rolled thread.

"The cold forging that threads receive during the rolling process strengthens them in tension, shear and fatigue."

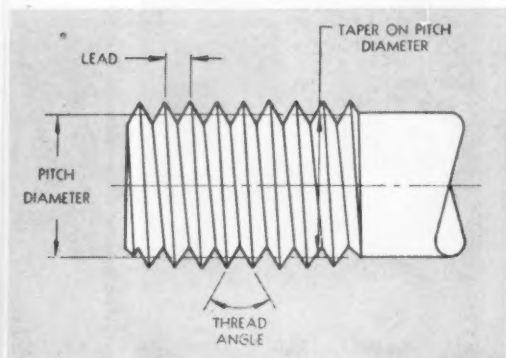


Fig. 3—Drawing showing elements that are controlled by pitch diameter tolerances.

the die faces. The working faces of the dies have a thread form which is the reverse of the thread to be produced. In penetrating the surface of the blank, the dies displace the material to form the roots of the thread and force the displaced material radially outward to form the crests of the thread. The blank has a diameter part way between the major and minor diameter of the thread.

A comparison of a cut and rolled thread is shown in Fig. 1. Unlike other threading processes, no material is removed and consequently no chips are produced.

Increased Strength

The cold forging that threads receive during the rolling process strengthens them in tension, shear and fatigue. When a thread is rolled, the fibers of the material are not

severed as they are in other methods of screw thread production. The grain of the metal is highly compressed and reformed in continuous unbroken lines following the contours of the thread as in any good forging, as shown in Fig. 2. Improved fatigue strength usually approximates 50 to 75 per cent. On heat treated bolts of C40 Rockwell hardness, that have threads rolled after heat treatment, tests show increased fatigue strength of 5 to 10 times that of cut threads.

Accuracy and Uniformity

The production of accurate threads normally requires that close control be exercised over pitch diameter, thread angle, lead, taper, and roundness. The tolerances specified for pitch diameter include all errors of pitch diameter, lead, thread angle and taper as shown in Fig. 3.

The thread angle produced on the work is dependent upon the accuracy of the thread rolling dies, while the accuracy of the lead produced is dependent upon the accuracy of the dies and the material being rolled. In most cases, the lead of the thread on the die is exactly reproduced on the material rolled.

There are a number of reasons why it is inherently easy to achieve accuracy on pitch diameter, thread angle, lead and taper by rolling and, what is often equally important, to maintain that accuracy over long

**"Since no material is removed in the form of chips,
material savings result . . ."**

periods of time. The thread form of a set of thread rolling dies is faithfully reproduced on the parts, and does not change appreciably during the entire life of the dies. Thread rolling dies do not wear out in the same manner as do other threading tools. Wear, instead of being concentrated on a sharp cutting edge, is distributed over a broad surface, and the rolling action is relatively free from friction. Therefore, the thread form of a rolling die is not changed by erosion, or does it fail to reproduce itself because of dullness or adhesion. It cannot be altered by improper sharpening, as sharpening is never required.

Smooth Finish

In cold forming operations the surface finish left on the work is a close approximation of the surface finish of the dies. This holds true in the case of thread rolling except that the threads produced are ordinarily smoother than the dies or rolls. This

improvement is accounted for by the slight slipping and burnishing that the thread always receives as it rolls against the dies.

By using carefully ground and polished dies and smoothly finished blanks, the ultimate in burnished threads can be attained. A comparison of thread finishes commonly produced by the various threading methods is shown in Table I directly below.

Saves Material

Where blanks are prepared by heading, extruding or stamping, or where the thread is the largest diameter on the part as in the case of a stud, rolling will save material. Since no material is removed in the form of chips, the blank is smaller than the finished thread and results in material savings ranging from 16 to 27 per cent on common threads up to 1½-inch diameter. On stampings, the thickness of the metal from which the stamping is made

TYPE OF THREAD	SURFACE ROUGHNESS—MICRO INCHES							
	250	125	63	32	16	8	4	2
SCREW MACHINE CHASED THREADS								
MILLED THREADS								
GROUND THREADS								
ROLLED THREADS								

Table I—Comparison of thread finishes commonly produced by various threading methods.

"... thread rolling is a versatile process capable of forming a wide variety of threads on many different materials."



Fig. 4—Illustration showing a number of parts made of different materials on which a variety of threads have been rolled.

can often be reduced. This saves the material used in the part and also in the scrap.

Versatility of Application

As shown in Fig. 4, thread rolling is a versatile process capable of forming a wide variety of threads on many different materials. For example:

- Standard and Special Thread Forms
- Tapered Threads, including Pipe Threads
- Multiple Threads
- Worm Threads
- Piloted and Step Threads
- Non-uniform Lead Threads

- Threading Close to Shoulder
- Threading of Hollow Parts
- Threading of Metal Stampings
- Threading of Die Castings
- Threading of Irregular Shaped Parts
- Rolling of Oil Grooves and Helical Grooves
- Rolling of Annular Grooves
- Burnishing
- Knurling, Splines and Serrations
- Crimping
- Socket Threads

Speed and Economy

Thread rolling machines may be manually loaded or arranged with semi-automatic or completely automatic feeding devices. Fully automatic hopper-fed thread rolling machines can be operated in batteries with several machines to each operator. Although it is generally appreciated that thread rolling has proved economical on large quantity production, similar savings and economies are realized on small lot production.

Threads may be rolled on automatic screw machines without reducing spindle speeds, and the fact that rolling can be done on the collet end of the part behind a shoulder often saves a secondary threading operation. Thread rolling dies do not require sharpening. Therefore, down time is reduced and sharpening and resetting labor is saved. The inherent uniformity of rolled threads also saves inspection labor.

Equipment

Most of the threads produced today are rolled on thread rolling machines and automatic screw machines. The thread rolling machines use flat and cylindrical dies, while the automatic screw machines use cylindrical thread rolls for either in-feed or end-feed rolling. In most instances, the entire length of thread is formed by the in-feed method without endwise feeding of the blanks or dies. Thru-feeding of the blanks is used in cylindrical die equipment for continuous threading of long bars and short headless parts.

Reciprocating (Flat Die) Machines

Flat dies are used in reciprocating types of thread rollers, including boltmaker machines. The machines are made in a number of sizes, each for a limited diameter range and with a specified length of die. Two dies are used; one stationary and one moving — and the rolling faces of the dies are located opposite

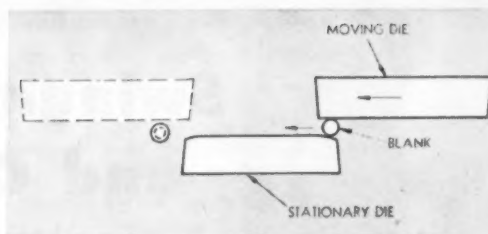


Fig. 5—In reciprocating types of thread rollers, two flat dies are used—one stationary and one moving with the rolling faces of the dies located opposite each other.

each other as shown in Fig. 5. A thread is rolled on one blank at a time during the forward stroke of the machine. There is no axial movement of the blank during rolling. The diameter of the finished thread is controlled by the diameter of the blank and the distance between the faces of the dies at the finish end of the stroke.

A few typical flat die applications are shown in Fig. 6 below, which will be found self-explanatory.

(To be continued in next month's issue)

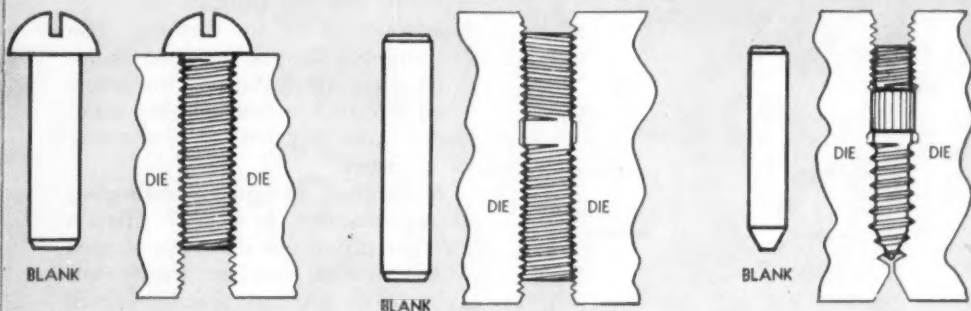
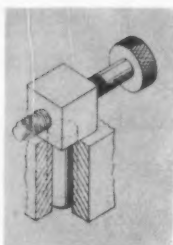


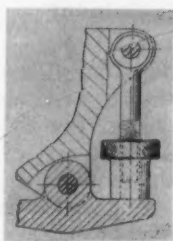
Fig. 6—Illustration showing typical flat die applications: (left to right) rolling threads on machine and cap screws; rolling of right and

left-hand thread on a part at the same time; and simultaneously rolling machine screw and gimlet point threads and knurling.



Swinging Bolts and Clamps

By FRED ROGERS



In this concluding article, the author portrays and explains swinging clamps in particular.

The first part of this article dealt with the swinging bolt as such, covering nuts, washers, knobs and handles. Angular positioning and quick release of swinging bolt nuts were illustrated and discussed. Tables of dimensions were also included. In this concluding part of the article, swinging bolt is applied to several specific designs of clamping arrangements.

In some assemblies, the bolt itself

is not the swinging member, but the pivot pin acts as such. In Fig. 14, the pivoting member is a three-diameter affair with straddle journals. The clamping screw hole is tapped through its middle. When the screw is loosened, the pin is turned a predetermined partial revolution to get the screw out of the way. This type of pin necessitates one loose ear or bearing support so that it can be assembled. Another method which can be used if both ears are integral with the fixture body is to bush one side, inserting the pin through the large hole followed by the bushing. The bushing can then be fastened as desired. In some instances, the screw must be given a considerable number of turns to get it out of the way of the work.

A similar design of swinging clamp is shown in Fig. 15. Here a straight pin of one diameter is used as the pivoting member. The two angular slots are cut about $\frac{1}{8}$ inch greater than the screw so that the latter can be swung out of the way. However, slots need not be provided on both sides of the pivot pin center

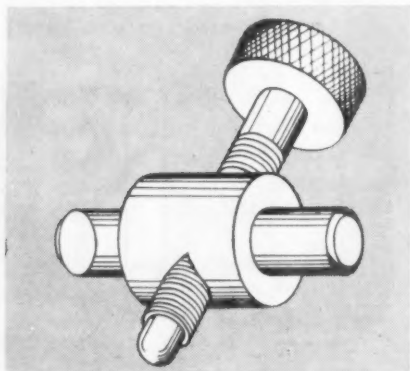


Fig. 14—Drawing of swinging clamp in which the pivoting member is a three-diameter affair with straddle journals.

"Extra tension can be placed on the screw by inserting a rod in one of the drilled holes in the head."

if it is not deemed necessary. If the ears are open at the top and the slot cut deep enough, the screw can be swung with the head upward in the unclamped position.

In Fig. 16, the knurled head screw enters the pivot pin through an open slot as mentioned above. The knob and screw are intergral. The hub of the knob clamps against the swinging arm. The pin is made of hardened drill rod and the screw thread and hub bearing surface are case carburized. This assembly is used for comparatively light work.

A heavier pivot assembly is shown in Fig. 17. The pivoting member accommodating the clamping screw is centered on two studs. These studs are screwed firmly into the center piece and turn with it. The bearing therefore is in the ears. These studs are sunk into the pivoting member

to provide alignment and strength. They are screwed tightly against the shoulder above the threaded portion. The binding screw is large in diameter and has a large knurled head. Extra tension can be placed on the screw by simply inserting a rod in one of the four drilled holes in the head.

Three clamping arrangements are shown in Figs. 18, 19, and 20 in which the horizontally located clamping screws are swung about a vertical pivot. In Fig. 18 the pivot has a square head through which the screw hole is tapped. The pivot simply rests in the hole against the upper surface of the fixture and can be swung around 90 degrees in either direction when unclamped or removed entirely from its pivoting socket.

In Fig. 19 the swinging member is retained in the pivot hole by a nut

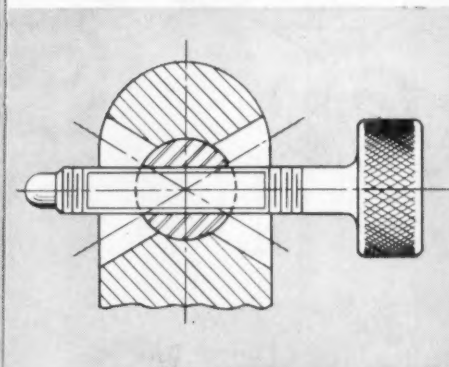


Fig. 15—Type of swinging clamp in which a straight designed pin of single diameter is employed as the pivoting member.

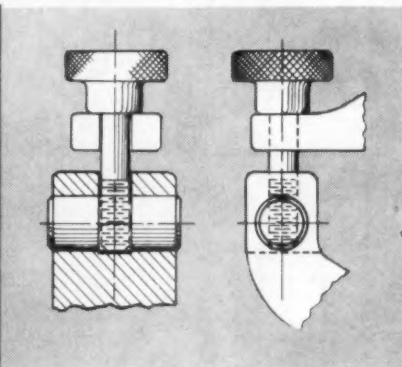


Fig. 16—Sketch showing portion of swinging clamp in which a knurled head screw enters the pivot pin through an open slot.

"... a thin humped spring washer maintains sufficient tension to keep the clamp screw in the required position . . ."

and washer. Under the solid washer is a thin humped spring washer to maintain sufficient tension to keep the clamp screw in the required position after it is swung out of the way. This is done to overcome vibration, thereby preventing interference of the screw with the loading of the work.

A purchased knob and shoe screw is used in the arrangement shown in Fig. 20. The cast swinging arm is pivoted at the left on a two-diameter stud and is retained by a washer and hex head screw. The stud is clamped into the fixture body and has a snug fit in the counterbored hole above the tapped hole. The upper

end of the stud is drilled and broached to accommodate a hex wrench as used with socket head screws. The threaded hole for the hex screw is below the hex hole. Although the clearance under the washer is shown exaggerated, it is only sufficient so that the arm can swing freely when the screw is free. The binding screw has a free-turning shoe at the lower end for clamping the work. A cast knob is pinned to the upper end of the screw.

The screw shoe and the pivot stud shown in Fig. 20 are hardened. One manufacturer of standardized jig parts lists 12 such screws in varying diameters and lengths. For $\frac{3}{8}$ -

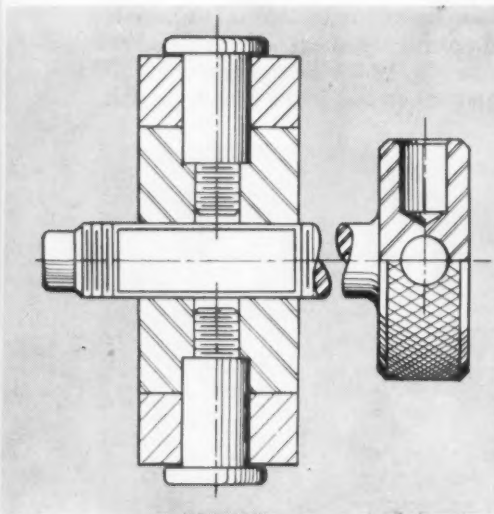


Fig. 17—Drawing of heavier pivot assembly in which pivoting member accommodating clamping screw is centered on two studs.

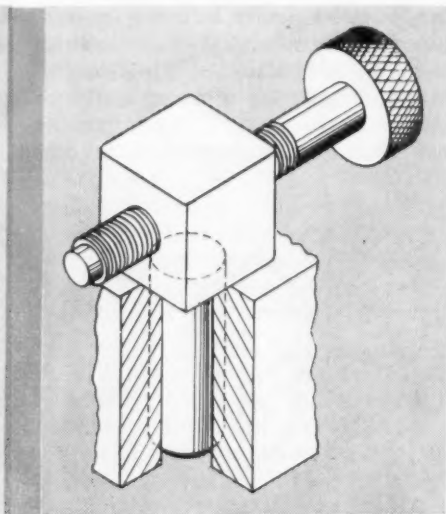


Fig. 18—Clamping arrangement in which horizontally located clamping screw is swung about vertical pivot of square-head design.

"The largest screw is $\frac{3}{4}$ inch with 10 threads, the threaded lengths being 2, $2\frac{3}{4}$, and $3\frac{1}{2}$ inches."

inch 16-thread screws, the length of thread is $1\frac{1}{4}$, 2, and $2\frac{3}{4}$ inches long. The shoes are $\frac{5}{8}$ inch in diameter x $\frac{5}{8}$ inch long. Screws of $\frac{1}{2}$ -inch diameter with 13 threads are $1\frac{3}{4}$, $2\frac{1}{2}$, and $3\frac{1}{4}$ inches long. Shoes for the $\frac{1}{2}$ -inch screw are $\frac{7}{8}$ inch in diameter x $\frac{7}{8}$ inch long. For $\frac{5}{8}$ -inch screws with 11 threads, the threaded lengths are 2, $2\frac{3}{4}$, and $3\frac{1}{2}$ inches. The largest screw is $\frac{3}{4}$ inch with 10 threads, the threaded lengths being 2, $2\frac{3}{4}$, and $3\frac{1}{2}$ inches. Shoes for the $\frac{5}{8}$ -inch screw are 1 inch in diameter x 1 inch long, and for the $\frac{3}{4}$ -inch screw they are $1\frac{1}{8}$ inches in diameter x $1\frac{1}{8}$ inches long. A four-pronged cast iron knob is pinned to the

upper end of the screw. The prongs have an overall diameter of $1\frac{1}{2}$ inches for the $\frac{3}{8}$ -inch screw, $2\frac{1}{2}$ inches for the $\frac{1}{2}$ -inch and $\frac{5}{8}$ -inch screws, and 3 inches for the $\frac{3}{4}$ -inch screws.

The free turning shoe in Fig. 20 is fastened to the end of the screw with a tangent pin. The end of the screw is turned down to a diameter just below the root of the thread. Halfway up its length a half-round groove is machined, the width and depth of the groove providing a running fit for the pin. This pin does not take the end thrust as is the case in some such assemblies. In this design, the bottom of the hole in the

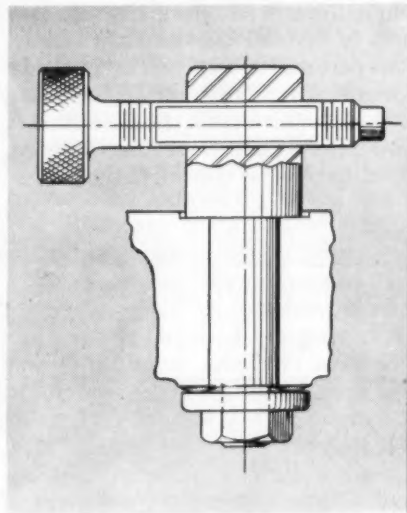


Fig. 19—Clamping arrangement in which swinging member is firmly retained in the pivot hole by means of a nut and washer.

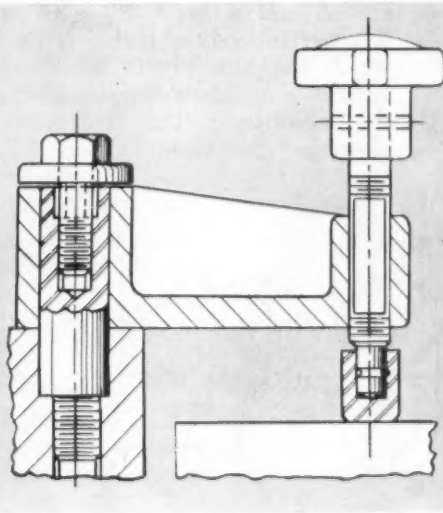


Fig. 20—Clamping arrangement in which knob and shoe screw equipped swinging arm is pivoted on two-diameter stud.

"This type of swinging clamp should not be used where heavy pressure is required . . ."

screw is square instead of drill-point shape. The end of the screw is radiused and bears against the square end of the hole. As stated previously, both the screw and shoe are hardened. The shoe is also cadmium plated.

The swinging arm itself sometimes carries the clamping screw. It need not be clamped in place by another screw, since as the screw clamps the work, the arm is automatically positioned. The next several sketches illustrate this point. In Fig. 21, the short arm, rounded at both ends, is pivoted on a stripper bolt. These stripper bolts are accurately made shoulder screws, obtainable from most of the manufacturers of hollow head cap and set screws. The body of the screw upon which the arm pivots is screwed against a counterbored shoulder in the fixture body. This arrangement affords greater strength than if the shoulder rested on top of the fixture

body. In the latter, the root of the thread would be the largest diameter that could be relied upon, whereas in the assembly shown, the body diameter is stronger at the joint. The knurled head screw must be screwed back about $\frac{1}{4}$ inch so that the arm can swing 90 degrees either way. The end of the screw is dog-pointed and hardened. This type of swinging clamp should not be used where heavy pressures are required because the clamping reaction must be absorbed by the stripper bolt. However, in the assembly shown, the overhanging leverage is kept as short as possible.

A more substantial type of swinging clamp than the previous example is the one shown in Fig. 22. The arm is pivoted between two sturdy cast ears and is radiused on one side for swinging clearance. The other end of the arm rests snugly between two heavy cast ears. The knurled head screw is considerably larger

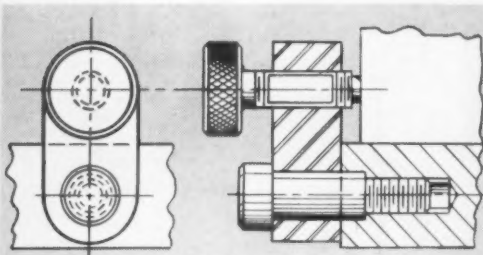


Fig. 21—Drawing of swinging clamp in which a short arm, that is rounded at both ends, is pivoted on a stripper bolt.

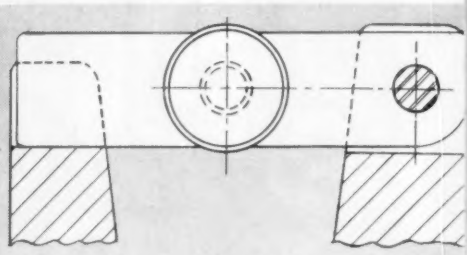


Fig. 22—Swinging clamp in which the arm is pivoted between two ears and reduced on one side for the purpose of clearance.

than the one in Fig. 21. Greater thrust is possible because the arm is backed up solidly by the four cast lugs against which the end thrust is absorbed. While an end view is not shown, the cross section dimensions of the arm are $1\frac{1}{4}$ inches high and 1 inch thick.

If the parts of the mechanism are narrow, as in the illustration Fig. 23, a strap-like clamp can be used. The swinging member is made of rectangular cold drawn steel and milled out between the ears after the bending operation. Not only does this member clamp the upper member but it centers it at the same time. In the unclamped position, it hangs down 180 degrees to the position shown.

In Fig. 24, a clamping arm is shown being used to hold on a cover. The screw is rounded at the end to engage a vee-groove in the cover. When the arm is swung back so that the cover can be removed, the flat, X, comes to rest against the body of the piece. The right angled arm and the screw are of sufficient weight to hold the arm outward after it passes over center. A quick flip of the finger readily throws the arm into clamping position.

The swinging clamp shown in Fig. 25 is a weighted arrangement. When the screw is loosened, being overbalanced, the screw end falls while the clamping arm raises to unclamp the work. This type of clamp is not capable of much movement, so that the work must be slid under the clamping portion. The action is end clamping with the screw and down clamping with the rounded end of the lever. The clamping member swings be-

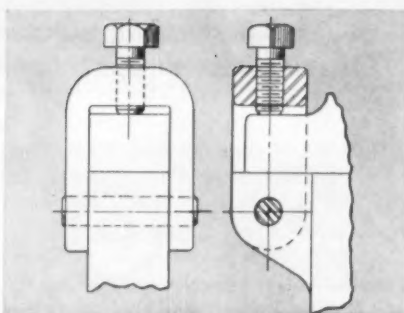


Fig. 23—Drawing of interesting clamping arrangement utilizing strap-like clamp.

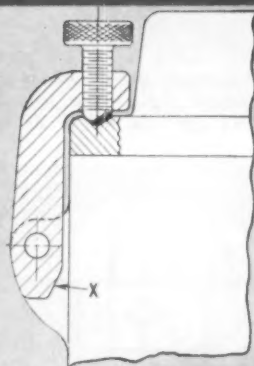


Fig. 24—Drawing showing design of clamping arm for holding on cover firmly.

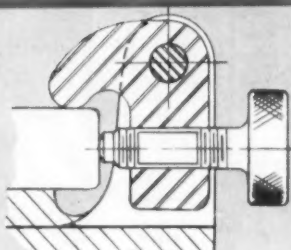


Fig. 25—Drawing of a swinging clamp in which weight is an important factor in unclamping the work that is being held.

**"... actual clamping is accomplished with an eccentric.
The swinging arm pivots from below ..."**

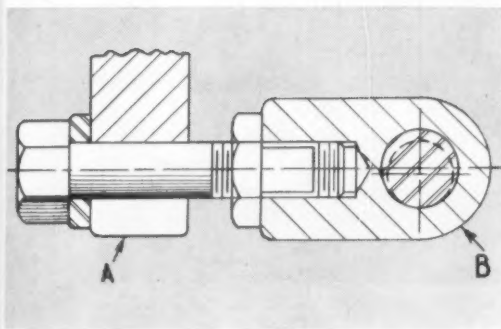


Fig. 26—Drawing of a swinging clamp whereby actual clamping of workpieces is accomplished with the aid of an eccentric.

tween two cast ears, having an easy swinging fit.

In the arrangement shown in Fig. 26, the actual clamping is accomplished with an eccentric. The swinging arm pivots from below and is designated A. The swinging bolt assembly consists of a hex head screw, nut, and washer, assembled with a pivot head. The screw is positioned in the clamping position and locked with a hex jam nut. The head pivots about center B. The eccentricity is $1/16$ inch, providing a throw of $1/8$ inch. The latter is enough movement to drop the washer away from the arm so that it can be swung outward and upward. The swinging pivot is made of steel.

The clamping screw shown in Fig. 27 is capable of swinging 90 degrees, no more and no less. A single stop plate controls this movement. The screw is pivoted in a swinging block A. A stop plate is screwed on the swinging arm at B. In the clamping position shown, the block contacts the plate C. When the clamp is loosened and the screw swings down 90 degrees to the right, the block stops against the lower side of the plate at D. The swinging arm is slotted deep enough to accommodate the screw end when at E. The screw is topped by a palm and finger-grip knob of cast iron. This design is especially intended for heavy work.

The clamp shown in Fig. 28 is of the cap type. The cap or upper mem-

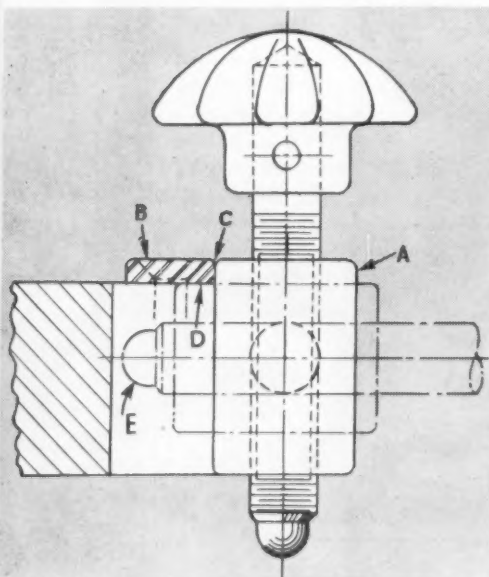


Fig. 27—Drawing of a clamping arrangement in which the clamping screw is capable of being readily swung 90 degrees.

"The pin is pressed into the block so that a straddle bearing exists."

ber is clamped by a tall headed screw and a swinging pivot block. The block is pivoted in the lower member by a fairly large pin extending through the two ears. The pin is pressed into the block so that a straddle bearing exists. The block is tapped at the upper end to accommodate the clamping screw. A slideable lever handle with a knob at each end facilitates adequate clamping. The upper end of the block extends into the slot of the swinging cap to maintain proper alignment. The clamp swings approximately 45

degrees or just enough to clear the cap when it is thrown upward.

In Fig. 29, an eye bolt is pivoted above the clamping lever and is supported by the slotted boss as shown. A knurled-headed nut is the clamping medium and bears against the clamping lever. The latter is pivoted and supported by two other ears on the main frame. A part of a revolution is all that is necessary to loosen the nut for swinging it out of engagement with the lever. The lower end of the hub provided on the nut is case carburized and hardened.

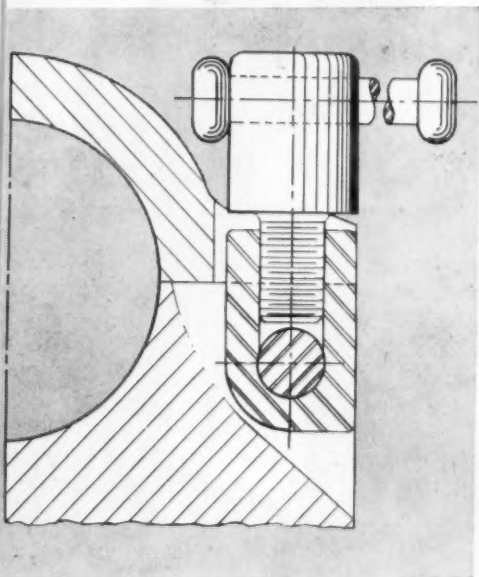


Fig. 28—Swinging clamp of the cap type in which the cap is clamped by means of a screw and a swinging pivot block.

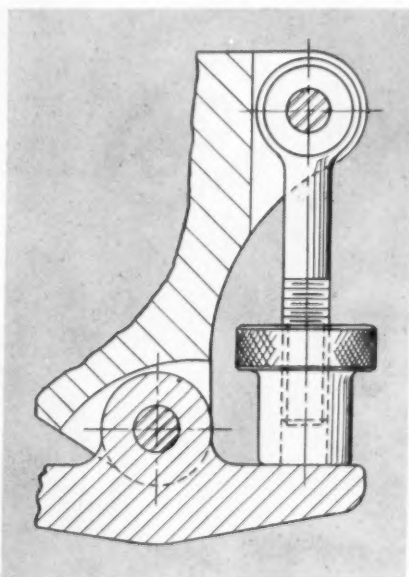


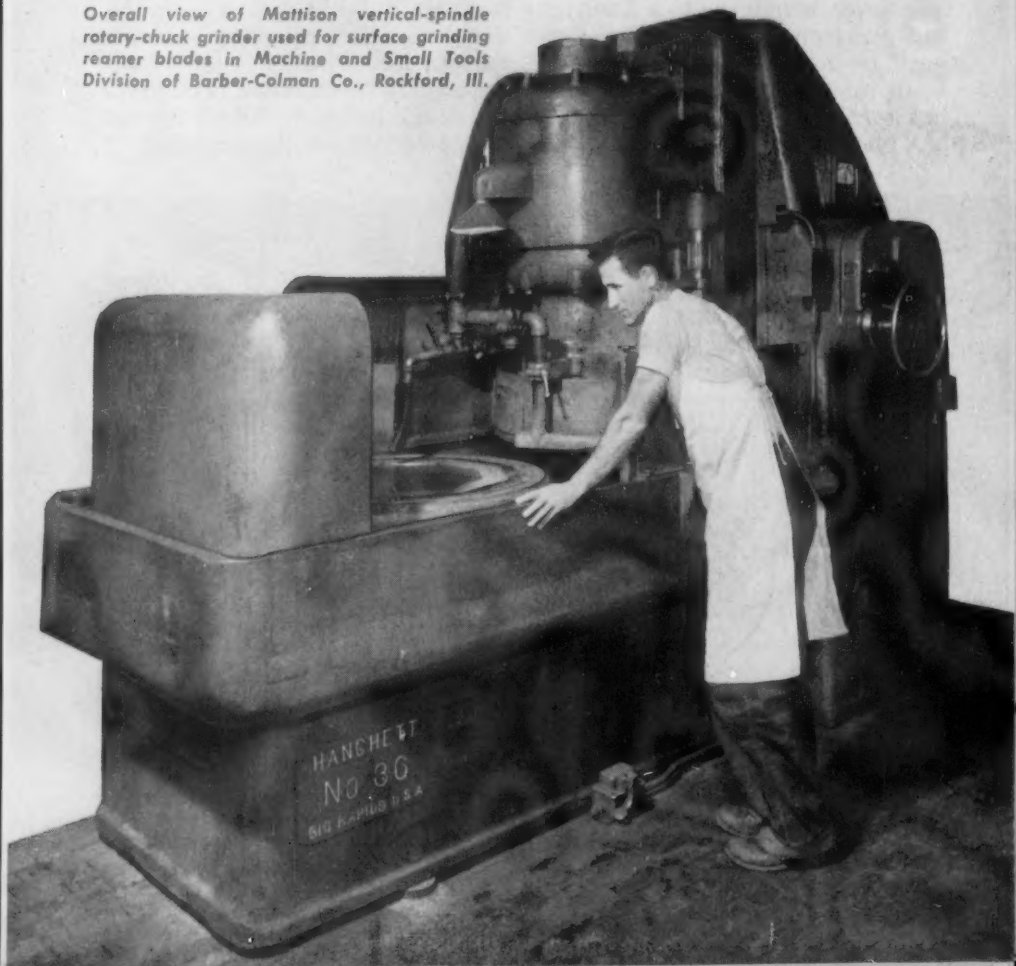
Fig. 29—Clamping arrangement in which an eye bolt is pivoted above the clamping lever and supported by means of a slotted boss.

Surface Grinding Inserted-Tooth

Vertical-spindle rotary-chuck unit provides for close-tolerance high production grinding.

By JOHN E. HYLER

Overall view of Mattison vertical-spindle rotary-chuck grinder used for surface grinding reamer blades in Machine and Small Tools Division of Barber-Colman Co., Rockford, Ill.



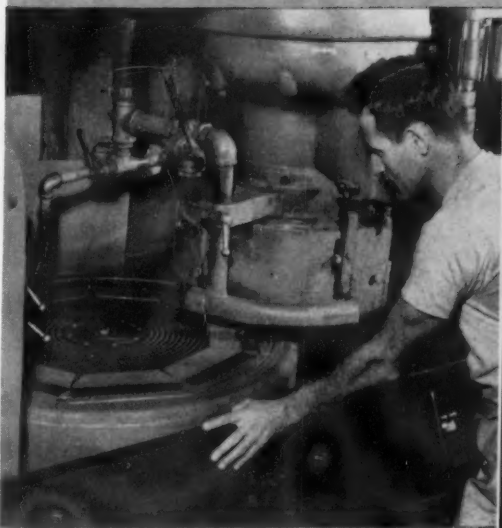
Reamer Blades

In the reamer shop of the Machine and Small Tools Division, Barber-Colman Company, Rockford, Illinois, one important operation is finish grinding two sides of inserted-tooth reamer blades. Many of these blades are of high-speed steel, and are finish ground on a Mattison vertical-spindle, rotary-chuck unit.

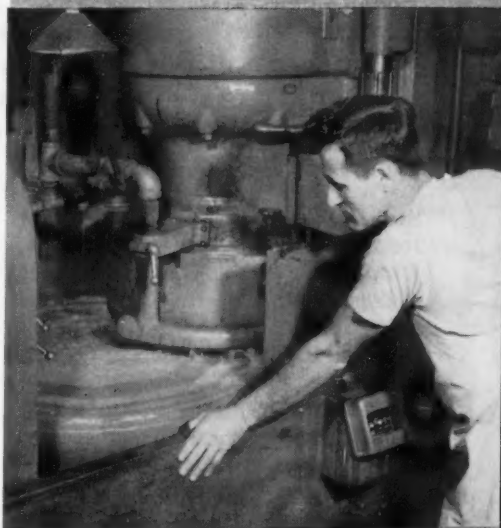
A high rate of production with satisfactory results is being achieved, mainly due to the much larger number of blades now being handled per load, as against what could formerly be ground on a small face grinder, using the o.d. of the wheel. On the smaller grinder, from 25 to 53 blades could be accommodated per chuck load, depending on the size of blade being handled. On the Mattison unit, 156 to 330 blades are handled per load, depending on the size of the blades. This provides an average production of 300 blades per hour.

For this work, a segment type wheel is used, made up of Bay State segments of specification 9A60E12-V92. A wheel speed of 1,875 r.p.m. is employed with a feed of 0.012 inch and a table speed of 20 r.p.m.

On this job, the wheelhead is set at exactly 90 degrees to the chuck, providing a good cross-hatched finish. The finish held is 10 to 12 micro inches, although a finish as fine as $2\frac{1}{2}$ to 3 micro inches can be and has been obtained, using a slow spark-out. Parallelism is held from 0.0002 to 0.0003 inch, and a size tolerance of 0.0005 inch is maintained. Blades vary from $3/32$ to $5/16$ inch.



Close-up view of rotary table and wheelhead of grinder used at Barber-Colman Co.



Close-up of unit made by Mattison Machine Works, Rockford, Ill., for grinding blades.

Automatically Controlling



Keyboard of Digimatic machine tool control. Dimensional information concerning the part to be produced is entered into high-speed computer by means of this keyboard.

By GILBERT C. CLOSE

A control tape produced on a planning desk in one city could be duplicated by telephone anywhere in the world, placed in a machine control unit, and production of the part immediately started.

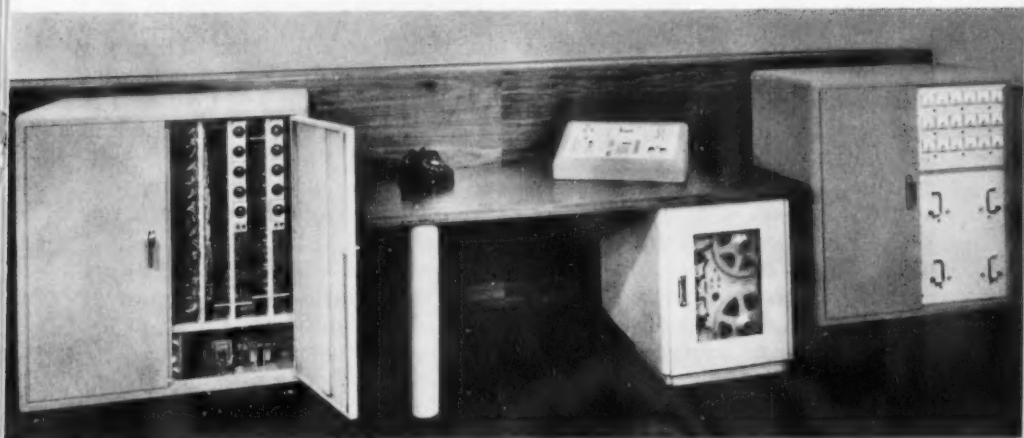
"Automation" and "push-button factory" mean the same thing to a lot of people. However, it will be a number of years before many factories enjoy automation in this fullest sense of its meaning. But during the interim, thousands of plants will begin to automate here and there, in spots along the production line, not necessarily removing an employee, but minimizing his chances to commit a human error.

It was this more rational aspect of automation that guided engineers at Electronic Control Systems, Inc.,

of Los Angeles, an affiliate of Stromberg-Carlson and a subsidiary of General Dynamics Corporation, when they began development of the company's recently announced "Digimatic" control device for shop machines. The "Digimatic" could be incorporated in a push-button factory control system, or just as handily used to control a single milling machine in the center of a large shop where everything else was done by hand.

In fact, Leonard Mautner, president of Electronic Control Systems,

Machine Operations



Planning desk of Digimatic numerical control device developed by Electronic Control Systems, Inc., for automatic control of machine tools. At left is high speed decimal computer which interpolates dimensional data into signals for controlling machine's servomotors.

Pulses are recorded on magnetic tape by a recorder located in the right pedestal of the desk in center. Keyboard for entering dimensional data is mounted on the desk. The cabinet shown at the right contains the power supply for all units of the planning desk.

made the statement that the chief markets for the new device would undoubtedly be among smaller and medium-sized shops that wanted to approach automation cautiously and well within the limitations of their budget. "The Digimatic is a relatively low-cost installation, requires little space, can be maintained as easily as a television set, and any machine operator who can read a blueprint can be trained to use it in a few hours," Mautner said.

The Digimatic consists of two principal parts—the planning desk, including a high-speed decimal computer and tape recorder, and a control unit which governs the operation of a machine by transmitting

the electrical impulses recorded on the tape into the operation of servomotors which in turn control the machine through its various axes of movement. The device checks itself throughout its operation. If an error occurs in the planning desk section, a light flashes to warn the operator. If an error occurs in positioning the machine on any one of its axes, delicate sensing instruments flash this information to the amplifiers in the control unit, and adjustments are made automatically. In fact, this sensing unit operates so swiftly that errors in machine movement do not have time to occur, but are kept at a zero level.

Briefly, this is how the Digimatic

"The number of channels any tape contains is determined by the design of the recording head . . ."

works. A coordinated reference point is established on the blueprint (either during its drafting, or on a print that has already been drafted). All distances on the blueprint are calculated from this reference point and entered on a planning sheet. These "distances from the reference point" may be either transverse, longitudinal, or vertical on a job involving three different directions or axes of machine movement. Thus, for a straight milling machine cut, the distance the machine would have to travel from the reference point, both longitudinally and transverse-

ly, would be calculated. Then the vertical travel to bring the cutter into the work would be calculated. If a circle rather than a straight line was to be cut, this fact would be noted on the planning sheet along with the distance from the blueprint reference point to the circle center.

Next, it is necessary to impart this information to the control tape. The control tape used in the Digimatic demonstration was $\frac{5}{8}$ -inch wide and contained eight channels for eight different types of recorded information. (The number of channels any tape contains is de-



Operator entering dimensions of part to be produced into Digimatic planning desk. Computer, in cabinet at left, interpolates dimen-

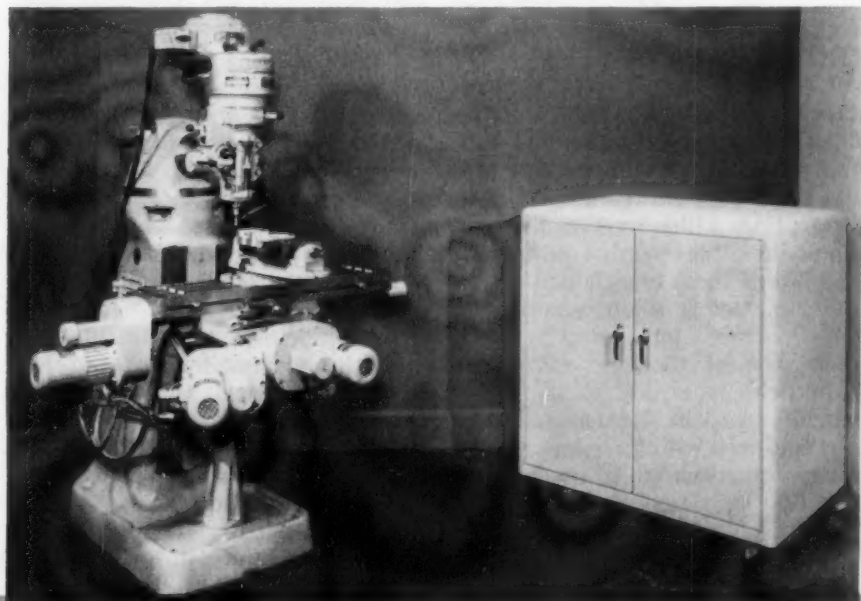
sional information into pulse signals which are recorded on magnetic tape. Cabinet at right contains power supply for all units.

terminated by the design of the recording head in the tape recorder.) Two of the channels on the demonstration tape contained information for right and left-hand longitudinal movements of the milling machine table in use; two more channels contained information for forward and aft transverse movements; two for upward and downward vertical movements. The remaining two channels were not used in the demonstration, but could have been used either for rotating or tilting movements if such had been possible or necessary.

The information on the planning sheet is fed into an adding machine-like device which in turn transmits it to the high-speed computer. The

computer "stores" this information until the operator has finished. The operator then presses a button marked "Compute," and the computer goes into action. All distances listed on the planning sheet (now "stored" in the computer) are automatically reduced to "one-thousandth inch components" and recorded on the tape in a manner to produce one inch of machine movement along any of its axes for each one thousand impulses. Thus, the demonstration set-up was limited to 0.001-inch accuracy, but it was pointed out that more impulses per inch of machine movement could be used, thus increasing the accuracy for high precision parts.

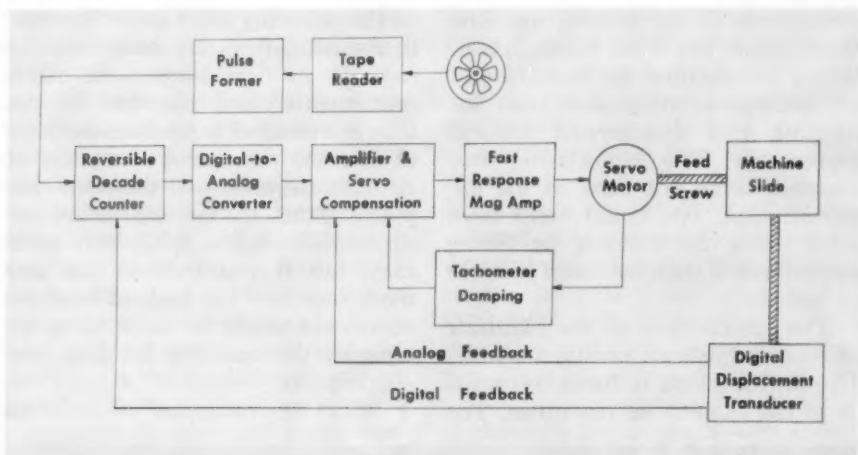
After the computer records all



Vertical milling machine and Digimatic electronic control unit. Numerical instructions, automatically computed by the planning desk

and recorded on magnetic tape, control operation of the milling machine. Digimatic is development of Electronic Control Systems, Inc.

"The number of impulses received by the motor control determines how long the motor would operate . . ."



Machine tool control functional block diagram. Courtesy Electronic Control Systems, Inc.

data from the planning sheet on the tape, the tape is rewound and then "played back" into the machine control unit. This unit contains a power amplifier which receives the electronic impulses recorded on the tape and builds them to sufficient amplitude to operate a servomotor control. A servomotor is used to power each axis of machine movement. The Bridgeport Model J milling machine used in the demonstration was equipped with three servomotors for the longitudinal, transverse, and vertical movements of the table. Thus, each motor received right or left-hand rotational directions from the two tracks on the tape set up to control it. The number of impulses received by the motor control determined just how long the motor

would operate, and thus how far it would drive the table in any direction of movement. If, for instance, the table had to move two inches to the right, two thousand impulses would be received from the tape channel controlling that particular direction of movement along that particular axis.

Each servomotor is equipped with a delicate sensing device which tracks its movements. Whenever motor movement (interpolated in terms of machine movement) does not correspond with the number of impulses it is receiving from the tape, this information is flashed back to the amplifier and adjustments are made automatically. Thus, there is no chance for an error to occur between tape instruc-

tions and actual motor operation.

Dials are used on the Digimatic control keyboard for modifying the instructions imparted to the computer (and then to the tape). One dial can be set to speed up or slow down the sequence in which the impulses are recorded on the tape, thus eventually speeding or slowing the machine operation. Another dial is set when it is wished to machine a circle. When a circle is being machined, two of the servomotors are in operation at the same time, with their speeds synchronized in a manner to move the table in a circular motion, either through an arc, or through the complete circle.

While the above may sound somewhat technical, most of what has been said is in the province of the electronic engineer and has no direct bearing on the operational aspects of the Digimatic. From the standpoint of the machine shop operator, he merely establishes the reference point on his blueprint, measures the distance from the reference point to the machine positions necessary to cut the desired part, puts this information on a planning sheet, and then uses this planning sheet to impart the information to the computer by means of the Digimatic keyboard. From there on, the process is fully automatic, except that the machine operator has to place the blank material in the machine.

As the Digimatic has nothing to do with machine operation except control its movements along preselected axes, it is quite obvious that it could be adapted to almost any shop machine. While a machine

control unit is required for each machine so adapted, a single planning desk can be used to prepare the tape for a number of machines. Tapes can be easily duplicated for production of the same part on different machines. In fact, a tape produced on a planning desk in Los Angeles could be duplicated by telephone anywhere in the world, placed in a machine control unit, and production of the part immediately started.

While exact cost figures are still not available, company officials estimate that the cost of the planning desk, including keyboard, computer, and tape machine, will be about \$25,000. Cost of the machine control unit and servomotors will run about \$5,000 per machine axis. Thus, it would cost about \$15,000 to automate a three-directional milling machine plus the \$25,000 for the planning desk setup. But as additional milling machines were added to the system, it would cost only \$15,000 each because all machines could use the same planning desk.



12-STEP CUT WITH ONLY ONE CUTTING TOOL!

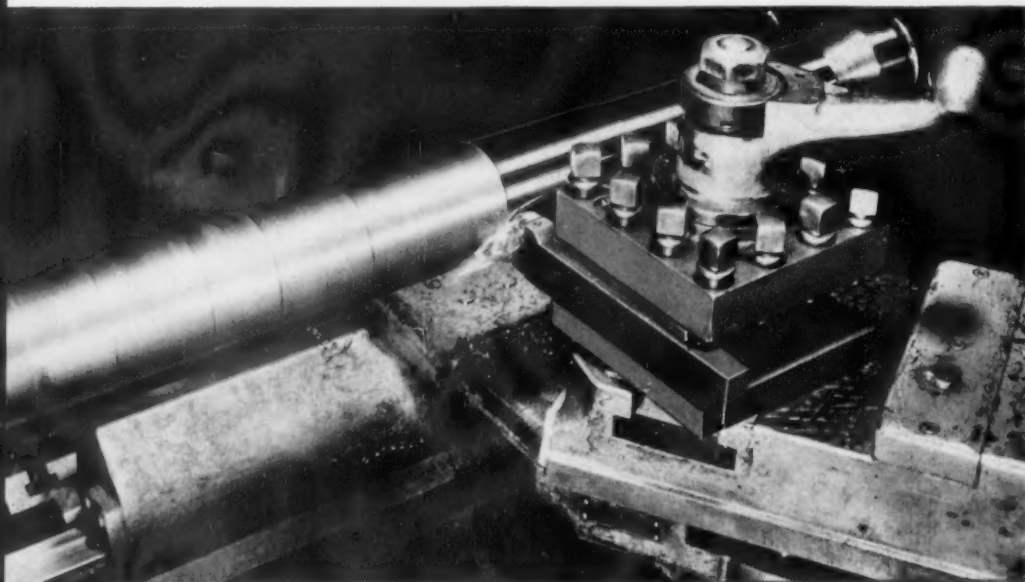
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Cemented Oxide Tools Increase Lathe

Large lathe manufacturer utilizes new cutting tool material to turn 31-inch spindles.

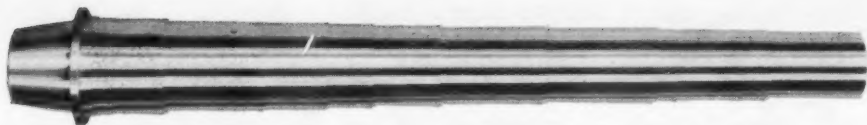
Stepped-up machine speeds through the use of cemented oxide in finish turning 31-inch lathe spindles recently enabled the R. K. Le

Blond Machine Tool Co., Cincinnati, Ohio, to both improve work finishes and increase production over 100 per cent. The time cycle for all



Close-up view of spindle finish turning operating at R. K. LeBlond, showing new Carbide grade 0-30 cemented oxide tool cutting at

715 feet per minute. Twelve-step finish turning time on each lathe spindle was reduced from 6 minutes to 2.8 minutes.



Type of finish provided by new cemented oxide cutting tool is indicated by this spindle.

Spindle Production

steps required to finish each spindle—minus loading time—was reduced to 2.8 minutes under actual production conditions. Under previous conditions, the cut took 6 minutes. Currently, the work is being turned at 715 feet per minute.

The job at LeBlond calls for making a 12-step cut with only one cutting tool along 29 inches of the 31-inch spindle. The latter is $3\frac{1}{2}$ inches in diameter stepped down to $2\frac{3}{8}$ inches at the opposite end. The nose end of the spindle is not involved at this stage of machining.

Prior to finishing, the spindles are first roughed out on a 16-inch tracer-controlled engine lathe to leave a constant depth of stock between $\frac{1}{64}$ and $\frac{1}{32}$ inch. The finishing operation is performed on the same type of lathe after all spindles at hand are roughed out at a feed of 0.0125 inch.

With the previously used cutting tool, the finishing operation was performed at a machine speed of 350 f.p.m. Following a run of 20 spindles,


it was necessary to change the tool for resharpener.

Application of the new Carboloy 0.30 cemented oxide tool with proper geometries, increased the machine output to 29 spindles before resharpener was necessary, finish turning each spindle in less than half the time. Size variation from spindle to spindle in each run of 29 varied only 0.001 inch without touching setup.

★ ★ ★

Resistance of Materials. Fourth Edition. By Fred B. Seely and James O. Smith. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 459 pages. Cloth binding. Price, \$6.50.

Essentially a new book, this edition provides a radical change in the usual approach to the subject and in the selection and organization of the topics covered. It aims at making the theory of resistance of materials more self sufficient as well as at developing more easily understood methods of analyses and design.



Glossary of Precision Measurement

The definitions contained in this glossary were prepared especially for the readers of Modern Machine Shop.

By CHARLES G. NOBLE
The Sheffield Corporation

The establishment of the Eli Whitney Metrology Laboratory at The Sheffield Corporation, Dayton, Ohio, focuses attention on one of the big problems in the field of precision measurement — the need for a standard nomenclature to be used throughout the industry. Take, for example, the word metrology which means “the science of measurement,” and is derived from the Greek “metro.” Until recently it was used primarily in the world’s national standards laboratories. Today, it is coming into popular usage in the inspection room, the shop and in the offices of top management.

The science of interferometric measurement has its own nomenclature and methodology—the definitions of which are sometimes far afield from those given in Webster’s dictionary. As an introduction to the field, a glossary of some of the more important terms has been prepared by the Eli Whitney Laboratory,

which was established to provide private industry with precise measurement facilities comparable to those of the world’s leading government standards laboratories.

Absolute measurement is the most accurate means of calibrating a gage block whereby its length is calculated optically in the seventh decimal by using three or more different wave lengths of light and a mathematical computation instead of a master block.

Barometric pressure is the barometer reading of the weight of the atmosphere on a column of mercury.

Calibration report is the written certification of size of all blocks. On Laboratory or Master blocks this certification includes detailed information of the flatness and parallelism errors of each block.

Coefficient of expansion is the amount of expansion (or contractions) per inch per degree of a given material as the temperature changes

from 20 deg. C. (68 deg. F.). Steel, for instance, expands 11.5 millionths of an inch per degree per inch. As an example, a 0.500-inch block measured at 20.2 deg. C. is 1.15 millionths of an inch longer at 20 deg. C.

Comparative measurement is the determination, mechanically or optically, of the difference between a gage block of a given nominal size whose deviation from nominal size is known to the millionths of an inch and a test block of the same nominal size whose deviation is not known.

Differential measurement is in effect a combination of Absolute and Comparative measurement. Two blocks of different lengths are compared optically in such a way as to give the absolute value of the difference between them, or, in other words, to give the absolute value of the block that would be required to be wrung to the shorter of the two to make them equal in length.

Error in flatness is the amount of contour error, such as convexity or concavity, of a single gaging surface of a gage block.

Error in parallelism is the amount of wedge between the two gaging surfaces of a gage block, or the amount of increase or decrease of thickness between two given points.

Gage block surveillance is a planned program for determining changes in gage block dimensions due to wear or abuse, with calibration being performed by a recognized Standards Laboratory.

Interference fringes are alternating light and dark bands seen in an interferometer. Light travels in a

wave motion. If two paths of light flow in opposite motion—the crest of one wave of one path, directly above the valley of the other—cancellation or absence of light results. The dark bands are therefore the areas where cancellation occurs.

Interferometry is a means of measuring length and contour of gage blocks. It uses accurately known wave lengths of a light source which, when passed through an optical system, cause interference fringes that are then interpreted much the same as lines on a contour map. (Interferometry is the most practical and accurate means of measurement known today.)

Isotope is one of two or more elements occupying the same position in the chemical periodic table, identical in chemical behaviour and distinguishable only by radio-active transformations or small differences in atomic weight.

Light source is a discharge lamp, hollow cathode tube or atomic beam used with an interferometer to give the necessary light to cause interference fringes. The tube can be filled with either cadmium, krypton, helium or mercury in gaseous state.

Light wave phase change is an alteration of position of the interference fringes of blocks with different surface finishes. Light acts as though it penetrates into the gage block and this "penetration" is deeper in a poor finish than a good finish.

Mercury 198 is a radioactive relative of gold and is used as a light source in interferometry. It is made by bombarding gold with neutrons forming an isotope with a mass of 198. It is a very desirable light

Glossary of Precision Measurement . . .

source because of its sharp fringe effect, and spectrum lines free of complex structure.

Metrology means the science of measurement and is derived from the Greek word "Metro."

Micro-interferometry is the application of light waves to the determination of the precise surface finish of gage blocks.

Micron is the thousandth part of one millimeter or 39.37 millionths of an inch.

Millionth of an inch is the division of the inch to the sixth decimal, 0.000001.

Monochromatic light is light of a single color, or wave length. For instance, Cadmium light when passed through a prism separates into three colors—red, green and blue. Each one of the three is then monochromatic light.

Optical flat is a fused quartz plate polished on at least one surface to a flatness of one millionth error or less. It is used for inspection of flatness of the gage block or as the reference base plane in optical measurement of length.

Surface finish error is the depth of lapping marks or surface scratches on the gaging surfaces of the gage block. If the finish is measured by an interference microscope, the result is a direct reading of depth. If it is measured by a profilometer, or similar instrument, the result is an averaged figure which is related in principle to the pitch diameter of a thread and is given as root mean square.

Vapor pressure is the pressure of the moisture in the air determined by a wet and dry bulb temperature reading. Vapor pressure affects the index of refraction of air the same as temperature and barometric pressure.

Wringability is the quality of the fine finish and flatness of the gaging surface of a gage block. It allows, by molecular interchange or film adhesion, two blocks to be put together and the resulting size to be equal to the sum of the individual sizes with no appreciable additional layer.

★ ★ ★

Transfer Feed Press Film

Clearing Machine Corporation, Division of U. S. Industries, Inc., has recently completed a sound-color movie based on the company's line of automatic, transfer feed presses. The movie, called "A Modern Fable," is on 16 mm. film and runs for approximately 20 minutes. Available to any industrial concern or organization wishing to use it, the movie should prove to be highly informative to engineers, production men and other executives in the metal-forming industry. Animations and direct camera work are used to explain the operation of a transfer feed press in detail.

Persons interested in obtaining this movie should write to U. S. Industries, Inc., Chicago Regional Advertising Department, 6201 W. 63rd Street, Chicago 38, Illinois.

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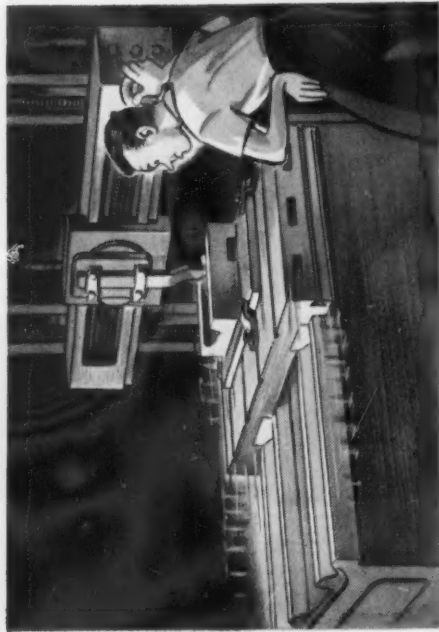
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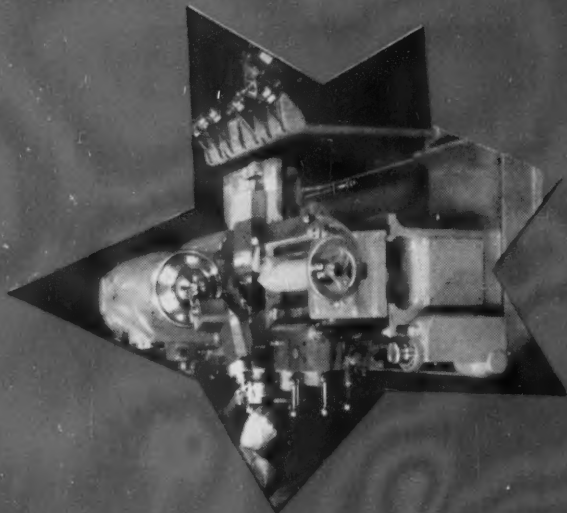
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Designing For Profit

Based on one of The Lincoln Arc Welding Foundation's recent award papers.

Shown in illustration Fig. 1 is a grinding machine for small cutters, end mills and general toolroom work, the pedestal base of which was designed as a weldment by Brown & Sharpe Manufacturing Company, Providence, R. I., after it had been decided to place an earlier bench-type grinder on the market. This

particular base had its disadvantages—too many inserted pieces in the construction, too inaccessible for convenient welding, too “traditional” in appearance, too costly to manufacture within time standards, too much machining of the complete assembly.

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Fig. 1—Cutter grinder before redesigning base.

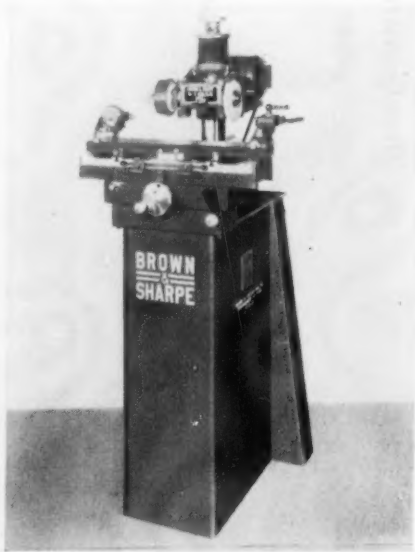


Fig. 2—Cutter grinder after redesigning base.

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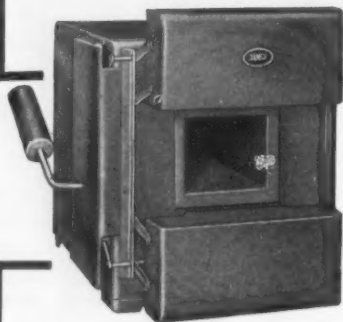
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138 modern machine shop

Designing for Profit . . .

the base, after a careful study, was redesigned (as shown in Fig. 2) through the cooperation of Richard B. Fleury, company stylist, and Leonard McDermott, foreman of the metal fabricating department. The revised base was considerably simplified, with 10-gauge sheet steel replacing the former 7-gauge material; welding footage held to a minimum; drilling and tapping eliminated; manufacturing cost reduced by 38 per cent; and material cost lowered by \$7.00. The new base has only six basic components, plus seven block sections comprising the upper pan which supports the cross slide and drive motor. Time of assembly and welding was reduced from 20.761 hours to 12.806 hours. Appearance was notably improved from a functional standpoint, and the entire assembly follows modern concepts of design and cost.

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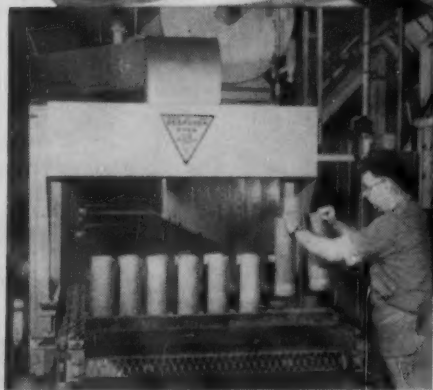
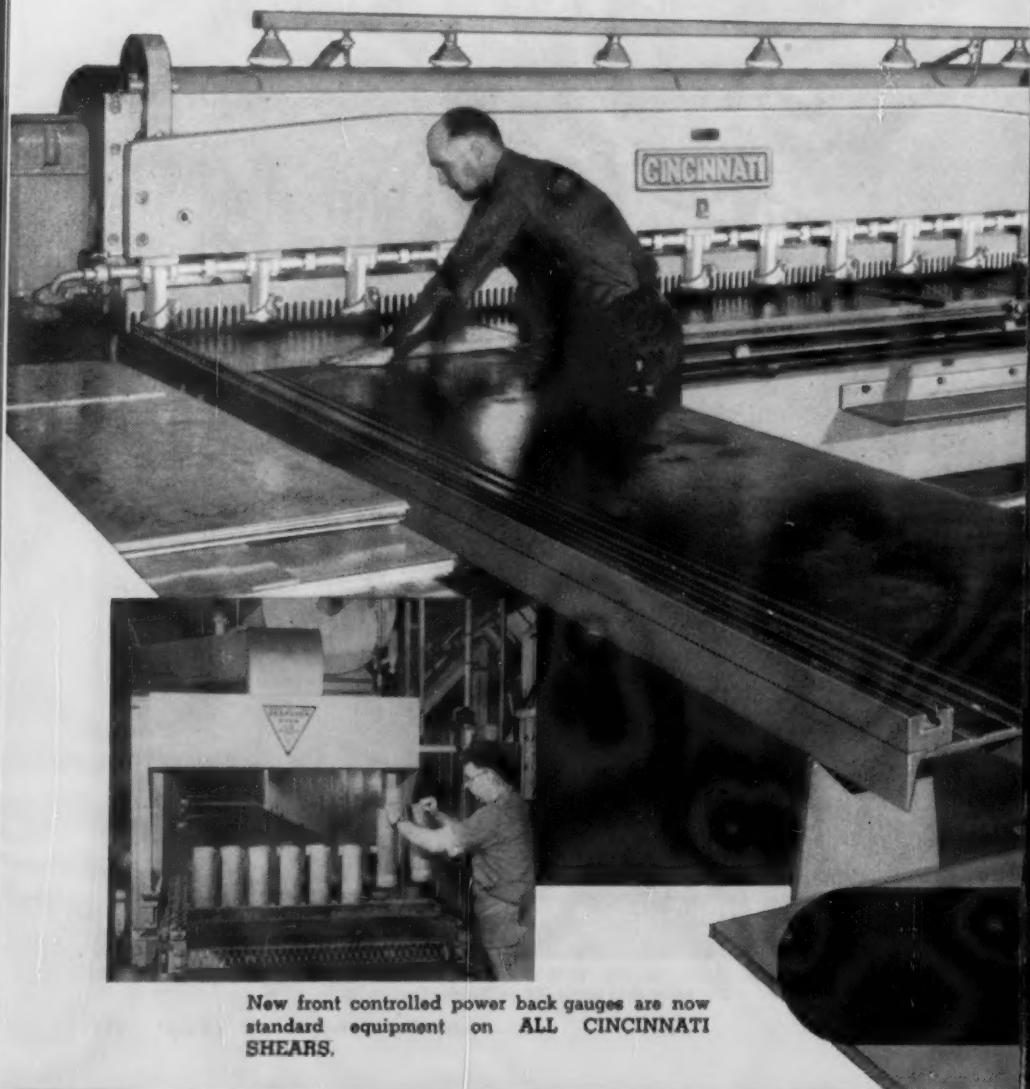
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modern machine shop 139

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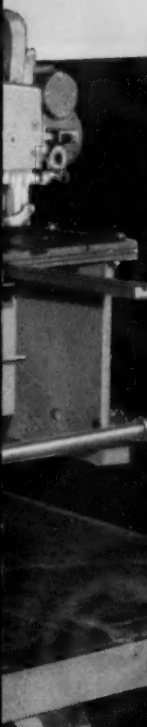
Photos courtesy Despatch Oven Company, Minneapolis, Minnesota.



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Visualizing Plant Layout in 3 Dimensions



The concluding part of an article presenting suggestions for saving time and money through efficient layout planning.

By H. H. DASEY

President, "Visual" Plant Layouts, Inc.

While it would be impossible to allocate the exact inch-space-requirements of the individual employee, it is safe to assume that roughly it would be four times his actual base-space requirement. So, here again, we are faced with the non-productive space use required by each employee yet which is necessary and vital to the everyday performance of his job. To put it briefly, then, for each employee or multiples thereof, we should provide:

(1) Working space, the determination of which is based on the type of work done.

(2) Locker space.

(3) Tool space.

(4) Cafeteria or eating space.

(5) Space for traffic lines between known points of travel.

(6) First-aid or hospital space.

(7) Office space for the proper processing of the records of each individual.

While this allocation of personal space needed by the employee may seem excessive, consider the non-productive space required for the maintenance of this man's mechanical duties. It makes no difference whether he runs a laundry machine, a printing press, a turret lathe, or a welding machine—a certain amount of space must be allocated for him in the mechanical performance of his duty and the maintenance of his equipment as follows:

(1) He must, first of all, be provided with a machine or mechanical device which at all times is as nearly perfect in its running conditions as possible. Thus, space is required for the maintenance necessary to keep his machine in shape.

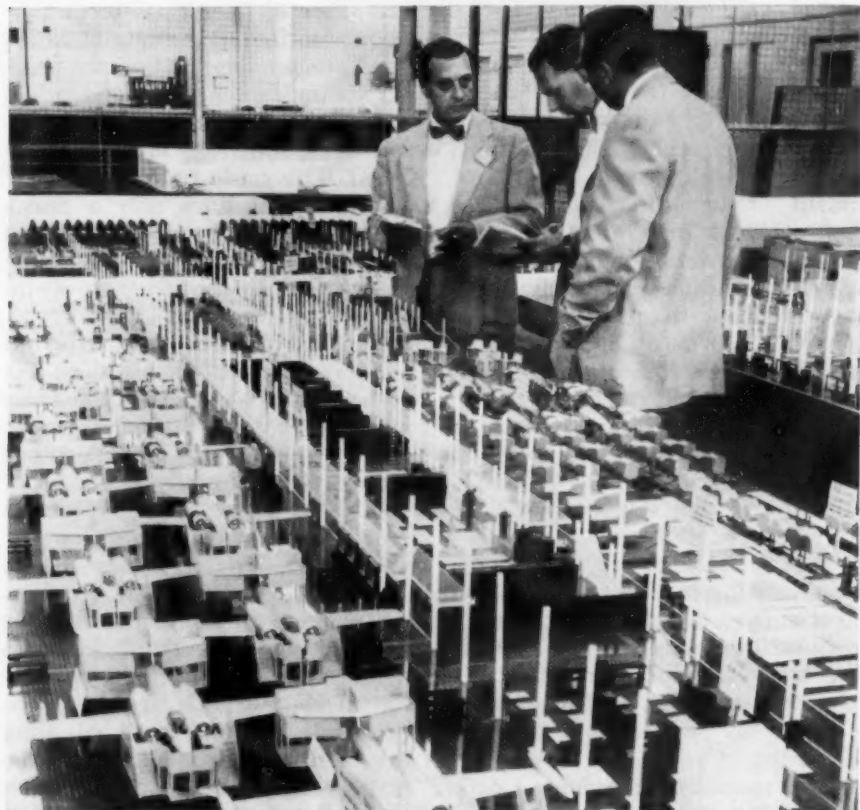
(2) He must at all times be supplied with tools and parts for his machine. Thus, there must be a tool supply space supplied.

(3) Unless the plant is high-

ly conveyORIZED, so that the delivery and dispatch of work in process is accomplished more or less automatically, each worker-machine unit requires a definite amount of storage space for material in process.

(4) There must be space allocated to each worker into which is delivered the material on which he is to perform his operation.

(5) When that operation is completed, there must be space



Scale model layout of 500,000 square foot plant of A. V. Roe Aircraft, Toronto, Canada.

"You cannot plan or make an intelligent layout with machine tools alone . . ."

provided for the storage of these finished parts until they are again moved to the next operation.

Another mechanical requirement is that he must be kept comfortable; a certain amount of space must be allocated to each individual in order to take care of the heating needs or cooling and ventilating needs of the plant. In order to protect the worker as well as the plant and equipment, fire protection equipment is needed; this is another space requirement.

In addition to the foregoing, "product assembly or development space" is of extreme importance. Small products in quantity, well conveyORIZED and mechanically handled, obviously require a great deal less space in transport and storage facilities than would larger products. Obviously, locomotives require a great deal more assembly space than would radio sets.

Thinking in this specific fashion, we finally arrive at the pretty well substantiated fact: **YOU CANNOT PLAN A LAYOUT WITH MACHINES ALONE.**

The above statement may strike terror in the hearts of all true templet cutters. On the other hand, it will tend to focus their attention on the true values of plant layout and the techniques that are demanded by present-day developments in manufacturing.

You cannot plan a plant or make an intelligent layout with machine tools alone because:

First, machines in themselves rarely account for more than 20 per cent of the *total* floor space in any plant. Check this in your own plant.

Secondly, the layout problem so far as machines are concerned is determined by their relationship to the product manufactured. This relationship is mathematically determined by the product, the number and types of operations to be performed on it, and the rate at which it is to be produced. Thus, the progression and order of the individual machine operations, such as turn, face, bore, and so on, is easily established. This basic processing order, however, constitutes only a minor and sub-elementary step in planning the layout. It merely determines the order in which the machine operation will occur.

Thirdly, you cannot plan a layout with machines alone, because: the principal problem in developing any layout is *movement*, and machines do not move; they go no place but simply occupy a predetermined spot and chew up material or parts in process as they are fed.

It is the activity the machines create in chewing up or processing material that presents the basic layout problem. Therefore, layout is not a matter of placing relatively few machines, but rather it is the problem of guiding and controlling the flight of the product through the plant — flight at about 36 inches above the floor. Most important is the handling of the materials and

PRODUCTION

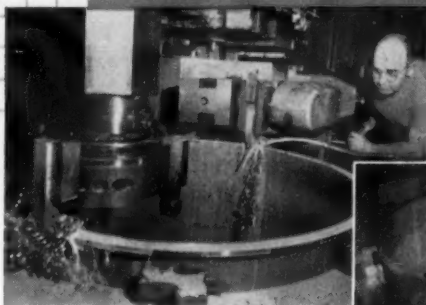
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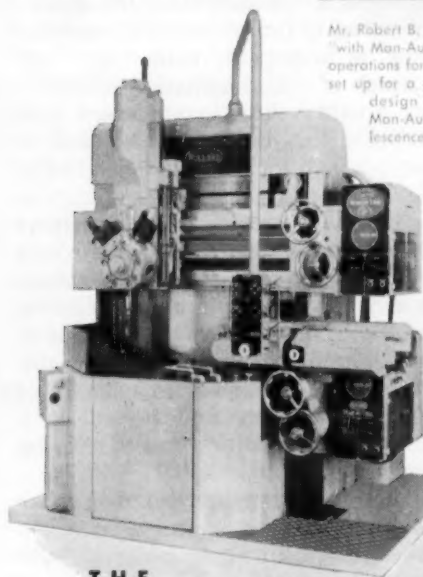
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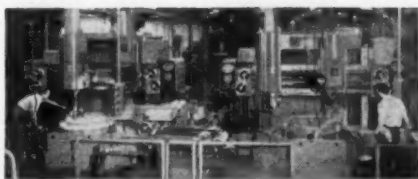
Mr. Robert B. Ballard, Production Manager at Solar-Des Moines, reports that "with Man-Au-Trol, Model 75, it is possible to do a multitude of machining operations formerly requiring numerous expensive machines which had to be set up for a particular operation, so limited in scope, that an engineering design change either obsoleted the tooling or the machine. With Man-Au-Trol, Model 75, because of its wide range of functions, this obsolescence is greatly reduced — if there is a design change, only a new set-up is made — not the purchase of a new multi-thousand dollar piece of machinery."

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modern machine shop 145

"... a great number of technical facts must be taken into consideration in any industrial planning project . . ."

parts from which the product is made.

Fourth, you cannot plan a layout with machine tools alone, because they represent only one-fifth or less of the pieces of equipment in the average plant. In the course of studying some 450 plants of all types, we found the average ratio of production machines to non-produc-

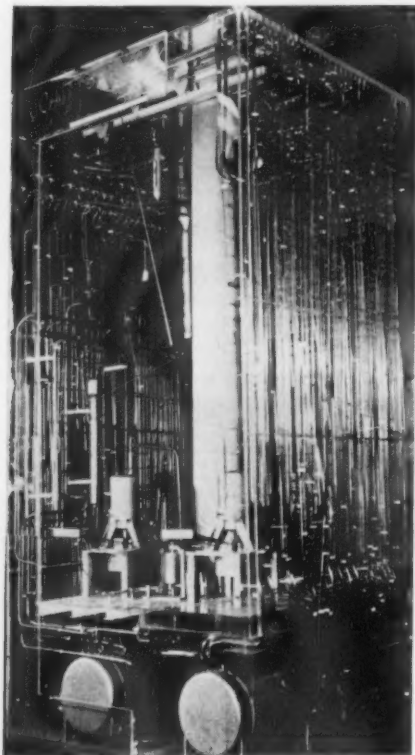
tion equipment to be about 6-to-1; i. e., there are about six non-production pieces of shop equipment for every machine or production element in the average plant.

Based on space-use or occupancy alone, it becomes very simple to figure the small percentage of space required for machines, in relation to the overall equipment necessary for full-plant operation. In a plant having a complement of some 6,000 pieces of equipment, very rarely will the machines of a production nature consist of more than 800 plus or minus.

Thus, a few templets arranged in a pattern, indicating the machine tool arrangement, cannot by any stretch of the imagination be called "a layout." Any management that accepts this haphazard method of layout is in for expensive headaches at a later date.

Until recently, management has not seemed to be concerned about the plant layout technique used. Only after tracing operating mistakes and losses to their source, has top management become conscious of the basic importance of proper planning and layout as a means of developing manufacturing efficiency.

All the foregoing, burdensome though it may seem, has been sketchily outlined in order to indicate the great number of technical facts that must be taken into consideration in any industrial planning project, and constitute the evidence



Scale model layout of Atomic Energy Plant at J. L. Pritchard Co., Idaho Falls, Idaho.

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"... 75 per cent of all planning must be done in the group minds of engineering and management . . ."

on which we are about to select or determine a proper type of plant layout technique. The optimum plant layout technique will intelligently record, in the final layout, the group engineering and thinking which obviously will end in the spending of some millions of dollars.

It is a plain fact, however, that while 75 per cent of all planning must be done in the group minds of engineering and management, there still comes a time when the results of this engineering-management thinking must be crystallized, must take some concrete form which will make clear to all observers and all those interested, exactly what the thinking has been, and make clear the solutions to the various problems that have been worked out.

In brief, we must reduce our thinking and decisions to a common language, one that is easily understood. This must be done because:

(1) Now that we have done our planning, the building must be built.

(2) Now that we have completed our thinking on the manufacturing operations, the equipment must be ordered and installed, or present equipment must be rearranged to fit the pattern.

(3) Management must be completely conversant with the whole operation as planned, in order to properly cooperate with the technical group.

How can this planning best be

done? What type of layout material would you, as an individual, recommend for use?

There are not too many choices of techniques. Until recently, drawings were used almost exclusively to portray the arrangement of machines and equipment, service functions, and so on, in planning layouts.

Then, because of the flexibility required in elementary planning or base planning, the paper templet was evolved. This paper or 2-D templet, cut from cardboard or other material, represented the actual space occupancy of the machine, the tool or piece of equipment and was suitably labeled. The fact that these loose templets could be moved around the layout at will until a suitable cycle of operation was established, helped immensely in the planning of our manufacturing areas.

Next came the elaborate templet. This templet, also made of various materials, represented the bulk space requirements not only for the space occupancy of the machine, but also showed door openings, table travel, head travel, and service-entry requirements. In many instances it noted the motor size and horsepower, the electrical voltages required for its operations, and other information, making it a more complete engineering device.

However, except in the most elementary of layout studies, the short-

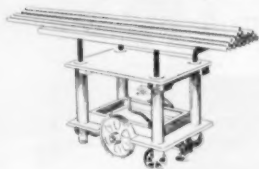
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"... it would be foolhardy to depend upon the memories of the group involved in determining any layout."

comings of the 2-D templet became obvious, and the 3-dimensional model, or replica, of the actual plant and its various pieces of equipment was developed.

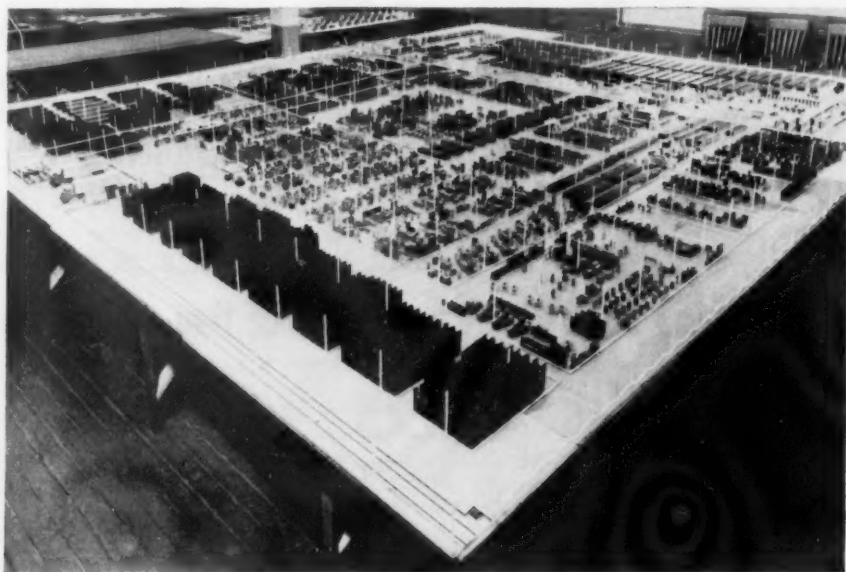
Three-dimensional planning, in most large companies, consists of an exactly detailed scale layout of all physical building characteristics, generally portrayed in transparent lucite. All columns, all walls, stairways, traffic ports, and so on, are exactly portrayed in the planning model.

Models are accurately produced, in exact scale of every piece of contemplated equipment, whether it be

a machine tool, material handling equipment, heat treating, assembly, office, or other items. Thus equipped with the physical attributes in exact proportion to the space to be occupied, the planning group is relieved of the necessity for remembering or translating thousands of minute details, such as were required in the templet layout method.

Because thinking is done in a cube, or in three dimensions, it would be foolhardy to depend upon the memories of the group involved in determining any final industrial layout.

Therefore, the three-dimensional



Scale model layout of 500,000 square foot plant of National Lock Co., Rockford, Illinois.

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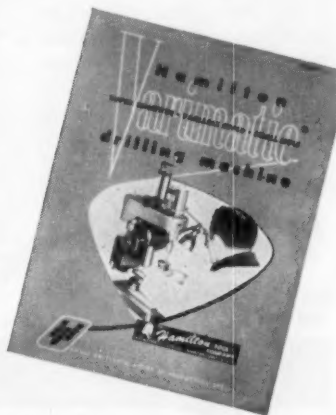
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".. three-dimensional system is accurate recording device."

planning system becomes not only an efficient, easily understood planning device, but at the same time is an accurate, clear and concise recording device which records exactly

the thinking of the participating group.

A new development which has been added to the three-dimensional model, and which solves the problem of reproducing finalized layout prints from the model, has recently been developed. For want of a better name, this development is called "the Repro-Templet system."

Heretofore, when the three-dimensional model was finalized and the layout was accepted, the problem of reproducing it in two-dimensional prints for architects, maintenance crews, machine installation crews, and so on, was a tedious and at best a makeshift method. Either a laboriously copied drawing from the model was used, or cumbersome and inaccurate patched-up photos of the three-dimensional plan. Today, however, the Repro-Templet method has eliminated the drawing time or the makeshift photography.

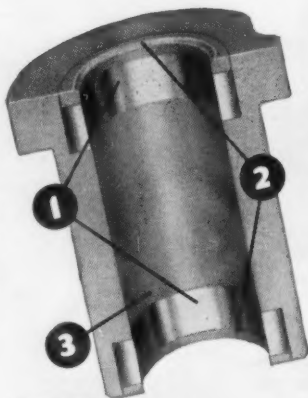
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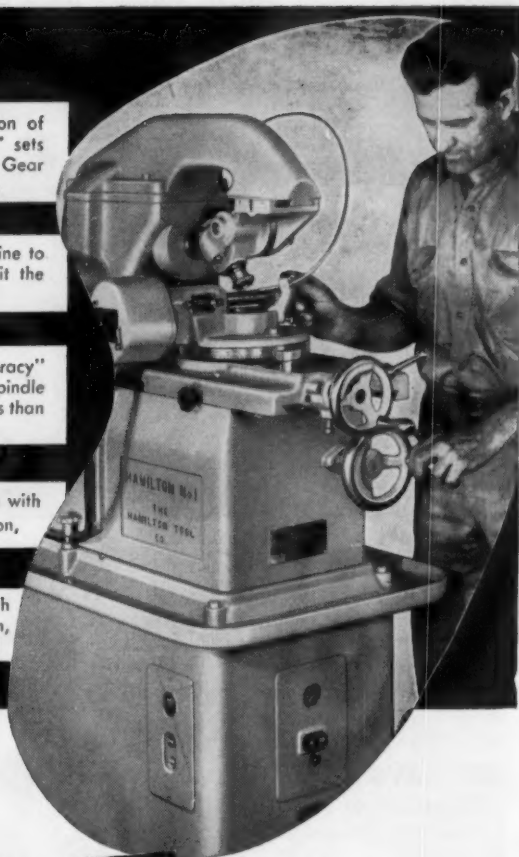
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"... quality and responsibility indicate technique to be used."

The Repro-Templet method, used in conjunction with three-dimensional planning, is simply a two-dimensional photographic film layout technique that can be copied from the three-dimensional model.



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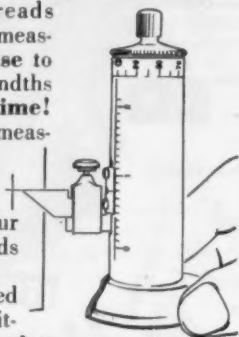
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In the light of current technological advances, we cannot continue to load the responsibilities of layout on outdated, inept or clumsy planning devices. The money responsibility alone, at times amounting to many millions of dollars, should drive management toward direct reliance upon efficient plant layout techniques, because it is in the planning

stages and the acceptance of the initial plans that the success or failure of any plant project rests. I therefore submit that the quality and the weight of the responsibility would almost automatically indicate the type of techniques to be used; and that these techniques unquestionably must be of the three-dimensional type. Being accurate, clear and concise, the three-dimensional type of layout leaves nothing to guesswork, requires no explanation or translation, and provides the best insurance against costly mistakes.



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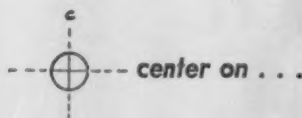
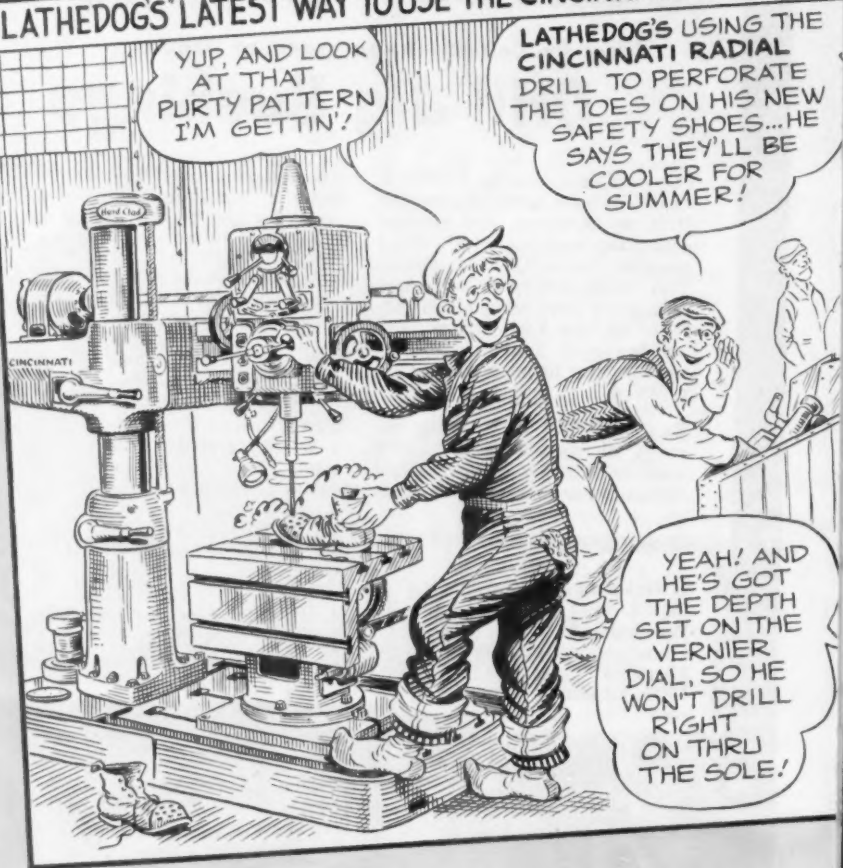
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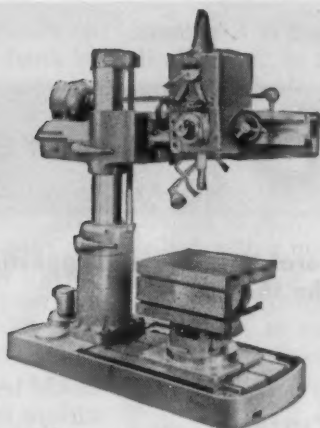
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ideas from readers

Several time-saving suggestions for the man in the shop.

Device for Safe Removal of Large Milling Cutters

By H. G. FROMMER

For the safety-minded supervisor, the writer describes in the following paragraphs a simple device designed to make the removal of large milling cutters from a vertical milling machine considerably safer and easier.

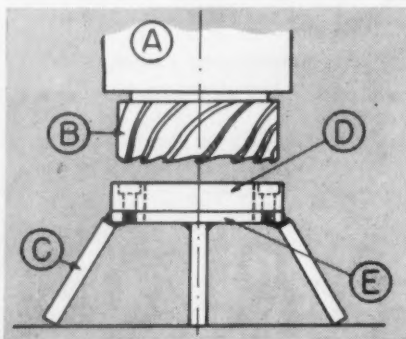
Referring to the accompanying sketch, a round steel plate with a large hole, *E*, is welded to three legs, *C*. A wooden ring, *D*, is then bolted to the weldment as shown. The bolts

should be countersunk below the top surface of the wooden ring to prevent damage to the cutter *B*.

To remove the cutter, the cutter-holding screw is loosened with a wrench. The device is placed on the milling machine table and the table is raised so that the top surface of the wooden ring touches the bottom surface of the cutter. The previously loosened screw of the cutter is then removed through the center hole and the table lowered.

Obviously, the reverse procedure is used for fastening cutters to the spindle *A*.

★ ★ ★



Device for removing large milling cutters.

Auxiliary Lathe Chuck for V-Head Screws

By W. M. HALLIDAY

As a result of a machining omission, a large quantity of V-head brass screws having special thread forms but standard type V-heads, as shown at *X* in the accompanying sketch, had to be returned to the machine shop for correction. This job comprised reproducing a plain

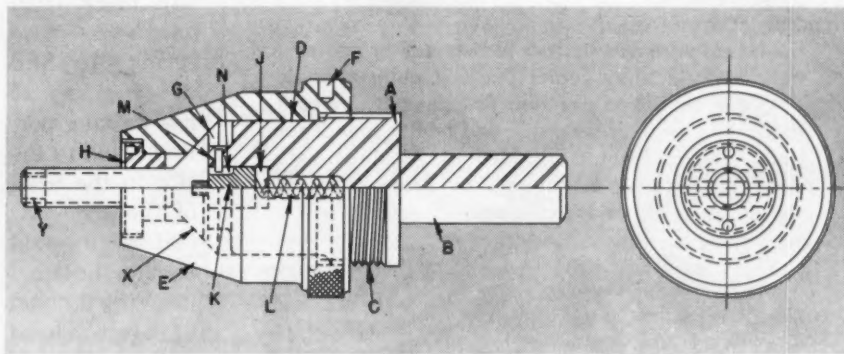
cylindrical portion concentrically on the end of the threaded shank of each screw in the manner shown by the dotted lines *Y* in the sketch. The performance of this operation presented considerable difficulties with regard to obtaining a sufficiently accurate, powerful, and yet safe grip on the head of each screw with existing equipment because of the almost knife edge at the periphery of each screw head. Moreover, the screw heads, unfortunately, had been electroplated with a bright nickel finish and no damage or disfigurement of these plated surfaces could be tolerated.

These difficulties were readily overcome by the introduction of the auxiliary chucking device shown in the sketch. Use of this device enabled the parts to be machined in the desired manner at a sufficiently fast rate to make the operation economical, and also insured complete freedom of injury to the plated heads.

Referring to the accompanying sketch, the chuck consists of a body member, *A*, with shank, *B*. The

member *A* is finely threaded, as indicated at *C*, to accommodate a correspondingly threaded locking cap, *E*, which has a close-sliding fit on the ground portion, *D*, of the member *A*. The cap *E* has a flange at the extreme right-hand end which is knurled to provide a hand grip and drilled with a number of blind tommy-pin holes, *F*. On the inside, the cap *E* is provided with a tapered surface, *G*, to correspond with the taper on the head of the screw to be gripped in the chuck. The left-hand end of the cap *E* is drilled out to a diameter approximately $1\frac{1}{2}$ times the diameter of the shank of the screw to be held. The extreme left-hand end of this hole is counterbored a short depth and internally threaded to accommodate a locating sleeve, *H*. Two blind holes in the left-hand side of the sleeve permit a wrench to be employed for setting and locking the sleeve in place.

The extreme left-hand end of the body *A* is reduced in diameter slightly below the maximum diameter of the screw head *X*, and a deep rectangular slot, *J*, is milled across



Sketch of an auxiliary lathe chuck which is designed for use in holding V-head screws.

ideas from readers . . .

the end of the body *A*, perpendicular to the endface, to accommodate, in an easy-sliding fit, a driving key, *K*. The latter has a narrow projecting tang for engaging with the slot in the head of the screw. A light compression spring, *L*, inserted in a hole drilled in the body *A*, serves to

force the key *K* into driving position. The spring is prevented from forcing the key completely out of the slot *J* by means of a stop pin, *M*, which is located in a hole in the side wall of the body *A* and which engages freely with a shallow open-ended slot, *N*, in the key *K*.

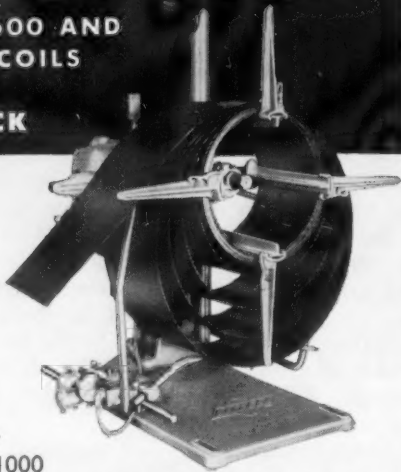
In using the auxiliary chuck, the shank *B* is gripped in the regular jaw chuck of the lathe in the usual

manner. The cap *E* is then removed and the screw *X* is inserted into the bore of the cap so that the shank projects out of the sleeve *H* at its front end, with the head of the screw bearing firmly against the surface *G*. The cap *E* is then threaded back onto the body *A* as far as it will go. In threading the cap back into position, the spring-loaded driving key *K* has its tang portion fitted in the slot in the head of the screw *X*, and is pressed back in the slot *J* until the flat end of the screw head is forced tightly against the left-

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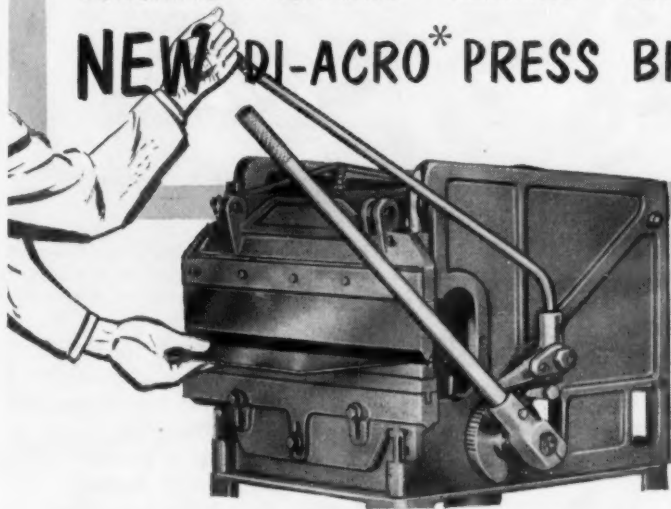
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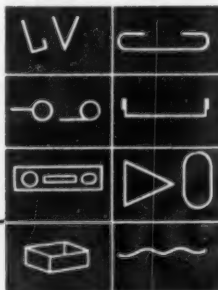
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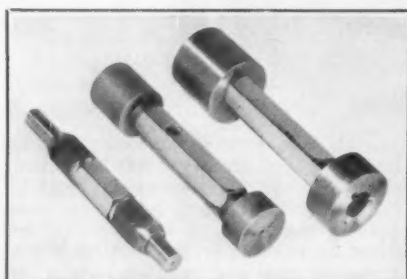
hand end face of the body A. The cap E is firmly locked on the body A by inserting a tommy pin in one of the holes F and applying pressure.

★ ★ ★

Low Production Punch and Die

By F. C. ELMO

In those cases where a limited quantity of parts is to be produced, die costs must necessarily be held to a minimum. The accompanying sketch shows how die costs can be reduced by making the punch and die from a single piece of steel.



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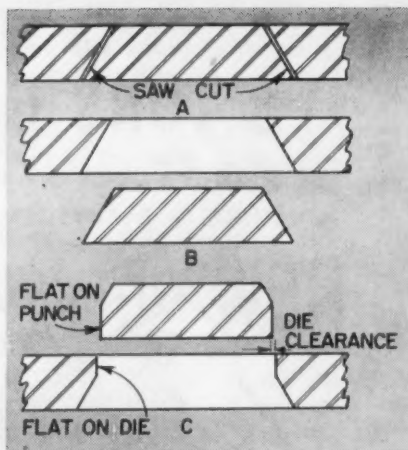
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162 modern machine shop



Sketch showing how punch and die designed for small production runs can be economically made from a single piece of steel.

outline of the required shape is cut out with a band saw, the table of which is set at a slight angle so that the saw cut is angular, as shown at A. The two parts thus produced are separated as shown at B, and a flat is filed on the entire periphery of the punch, and a similar flat filed in the die opening so that proper die clearance is obtained, as shown at C. The two members are then hardened and, after a slight amount of stoning, are placed in use. The

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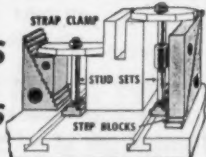
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CLAMPS

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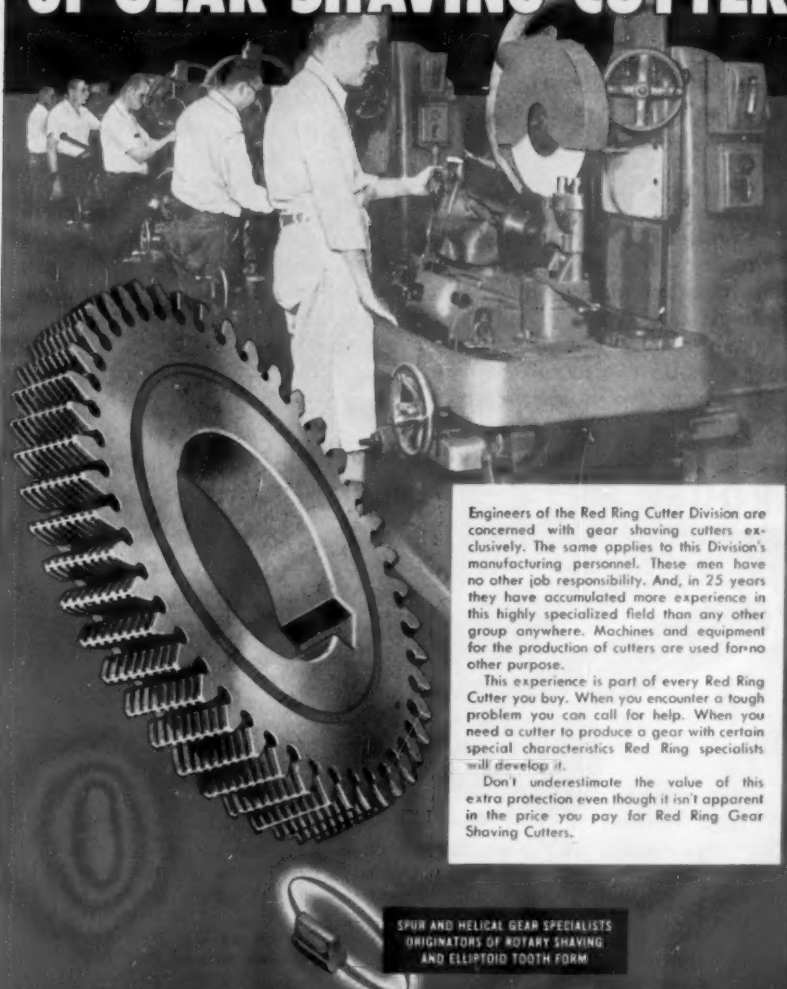
TIETZMANN TOOL CORPORATION
ENGLEWOOD OHIO



For more data circle 318 on Reader Service Card

July, 1956

A Tip to the Buyer of GEAR SHAVING CUTTERS



Engineers of the Red Ring Cutter Division are concerned with gear shaving cutters exclusively. The same applies to this Division's manufacturing personnel. These men have no other job responsibility. And, in 25 years they have accumulated more experience in this highly specialized field than any other group anywhere. Machines and equipment for the production of cutters are used for no other purpose.

This experience is part of every Red Ring Cutter you buy. When you encounter a tough problem you can call for help. When you need a cutter to produce a gear with certain special characteristics Red Ring specialists will develop it.

Don't underestimate the value of this extra protection even though it isn't apparent in the price you pay for Red Ring Gear Shaving Cutters.

SPUR AND HELICAL GEAR SPECIALISTS
ORIGINATORS OF NOTARY SHAVING
AND ELLIPTOID TOOTH FORM

NATIONAL BROACH & MACHINE CO.

5600 SE. JEAN • DETROIT 13, MICHIGAN
WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

For more data circle 319 on Reader Service Card

ideas from readers . . .

punch and die may be used as is or mounted on soft back-up blocks as desired.

★ ★ ★

Hardness Identification Method Aids in Grinding Die Blocks

By CLIFF BOSSMANN

Quite frequently when a grinder operator has to grind die blocks and other blocks on the die shoes, he is not aware of the fact that some blocks are hard and others are soft. Consequently, his grinding wheel has a tendency to

SURFACES TO BE GROUND

HARD

SOFT

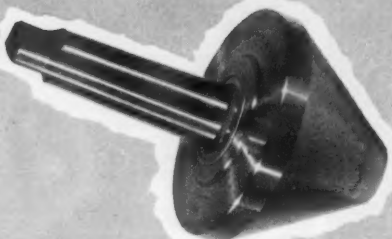
Stamping die blocks "Hard" or "Soft" before grinding, as shown in this sketch, enables grinder operator to readily determine proper type of abrasive wheel to use for the grinding operation to prevent "wheel loading."

"load up" which results in frequent wheel dressing.

If the blocks were stamped "Hard" or "Soft" as shown in the accompanying sketch, the grinder operator would instantly know what type of wheel to use in grinding each block. In certain instances, stamping the kind of steel on the block would also help in determining the proper grinding wheel to be used.

ROOFE

HEAVY DUTY



**BULL NOSE
CENTERS**
**Guarantee
Perfect
Alignment**

Two double rows of ball bearings in the large and small ends of this Bull Nose Center mean perfect alignment on any type of work.

Two shank sizes provide diameters from 1/2" to 7 1/2" for a variety of work with a single center.

Write for catalog.
Distributors Wanted.

HOUSTON GRINDING & MFG. CO., Inc.

P. O. BOX 7261

• HOUSTON 8, TEXAS

For more data circle 320 on Reader Service Card

CINCINNATI
BICKFORD
SUPER SERVICE
Radials



Built in 4 foot to 8 foot arm, 13 inch to 19 inch column. Spindle speeds may be as low as 8 RPM or as fast as 1750 RPM.

**For faster
metal
drilling...**

This ultra-modern
head... CHARTS and
PRE-SELECTS PROPER
SPEEDS and FEEDS

You chart, you control, you speed up operations and have a record for reference with this advanced head. The prescheduling chart plans sequence of operations and is a complete guide for the operator. Instant, quiet, hydraulic selection and changes of 36 speeds and 18 feeds are preselected by two convenient, easily read dials. Controls for clamping of column, arm and head, and arm elevation by power are at the operator's finger tips.

*Write for Bulletin R-33 describing this
ultra-modern tool*

**CINCINNATI
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RADIAL AND UPRIGHT DRILLING MACHINES

CINCINNATI BICKFORD DIVISION

GIDDINGS & LEWIS MACHINE TOOL COMPANY

OAKLEY, CINCINNATI 9, OHIO, U.S.A.

new literature

Use the Reader Service Cards opposite pages 32 and 324 for requesting free copies of the literature listed below.

1. Cylinder Square

A A Gage Co., 350 Fair St., Detroit 20, Mich. Magnetic cylinder square that checks squareness in seconds.

2. Mist Generators

Aetna Manufacturing Co., 192 S. York St., Bensenville, Ill. Coolant Mist Generators.

3. Portable Tools

Albertson & Co., Inc., Sioux City, Iowa. Sioux valve face grinders, screwdrivers, impact wrenches, drills, bench and portable grinders, flexible shafts, saws, sanders and polishers.

4. Socket Screw Products

The Allen Manufacturing Co., 133 Sheldon St., Hartford 2, Conn. Plating and surface treatment of socket screws, pipe plugs, nuts, dowel pins and hex keys.

5. Borescopes

American Cystoscope Makers, Inc., 1241 Lafayette Ave., New York 59, N. Y. Uses of A.C.M.I. borescopes in various industries.

6. Balancing Ways

Anderson Brothers Manufacturing Co., Rockford, Ill. Super-accurate balancing ways.

7. Rust Preventives

F. E. Anderson Oil Co., Inc., Box 216, Dept. RP, Portland, Conn. Rust preventives and coatings for industrial applications.

8. Hack Saw Blades

Armstrong-Blum Manufacturing Co., 5700 W. Bloomingdale Ave., Chicago 39, Ill. Marvel high-speed-edge hack saw blades are unbreakable.

9. Steel Pipe and Tubing

The Babcock & Wilcox Co., Tubular Products Division, Beaver Falls, Pa. Croloy steel pipe and tubing for high temperature service.

10. Weldments

Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa. Fabrication of large custom-designed weldments.

11. Sandpaper

Behr-Manning, Division of Norton Co., Dept. G, Troy, N. Y. How to choose sandpaper.

12. Grinding Wheels

The Blanchard Machine Co., 64 State St., Cambridge 39, Mass. "The Art of Blanchard Surface Grinding."

13. Couplings

Browning Manufacturing Co., Maysville, Ky. Fixed bore, chain, flexible and rigid couplings.

14. Internal Grinder

Bryant Chucking Grinder Co., P.O. Box 620-D, Springfield, Vt. "Centalign" automatic internal grinder.

15. Multi-Spindle Machine

The Bullard Co., 286 Canfield Ave., Bridgeport 9, Conn. Multi-automatic Type "L" produces repetitive pieces to close tolerances.

16. Tool Steel

The Capewell Manufacturing Co., Hartford 2, Conn. Standard sizes of Microloy ground flat tool steel.

17. Hand Cleaner

The Chemical Corp., 85 Waltham Ave., Springfield 9, Mass. Phlo waterless hand cleaner for grease, oil, grit and grime.

18. Gun Drills

Chicago-Latrobe, 419 W. Ontario St., Chicago 10, Ill. Precision-made carbide-tipped gun drills.

19. Bronze Bearings

Chrysler Corp., Amplex Division, Detroit 31, Mich. Oilite standard self-lubricating bronze bearings.

20. Grinding Machine

Cincinnati Grinders, Inc., Cincinnati 9, Ohio. Filmatic universal grinding machine.

21. Press Controls

Danly Machine Specialties, Inc., 2100 S. Laramie Ave., Chicago 50, Ill. Controls designed and built exclusively for press operation.

22. Decimal Equivalent Chart

Dayton Rogers Manufacturing Co., Minneapolis 7D, Minn. Decimal equivalent chart and calendar.

23. Power Screwdrivers

Detroit Power Screwdriver Co., 2807 W. Fort St., Detroit 16, Mich. Screw-driving machines, bowl feeder and barrel feeder.

24. Grinding Wheels

The DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill. Complete line of surface grinding wheels and bench grinder wheels.

25. Tool Bits

The duMont Corp., Greenfield, Mass. High speed, ground square and rectangular tool bits.

26. Adjustment Attachment

Durant Tool Supply Co., Providence 3, R. I. Vernier adjustment attachment for all roll feeds.

27. Drilling Units

The Electro-Mechano Co., 265 E. Erie St., Milwaukee 2, Wis. Model 603 one-half horsepower automatic drilling units.

28. Heavy Machinery

A factual and pictorial view of the plants and products of Farrel-Birmingham Co., Inc., Ansonia, Conn.

29. Rolling Mills

The Fenn Manufacturing Co., Newington, Conn. Standard line of rolling mills for rolling ferrous and non-ferrous metals in the form of sheets, strips, wire or rods.

30. Index Tables

Ferguson Machine & Tool Co., Roller Gear Division, P.O. Box 5841, St. Louis 21, Mo. Intermittor index tables for precision indexing at high speeds on large volume production.

31. Square Spanner

Firearms International Corp., Washington 22, D. C. The Polyp square spanner for welding operations.

32. Heavy-Duty Carbide

Firth-Sterling, Inc., 3113 Forbes St., Pittsburgh 30, Pa. Firthite TXH—a specially designed carbide grade to be used for general purpose, heavy-duty work.

33. Shelving

The Frick-Gallagher Manufacturing Co., Wellston, Ohio. Quick-Bilt all-purpose storage shelving.

34. Coolant Pumps

The Fulflo Specialties Co., Inc., Blanchester, Ohio. Model PRS4 and PLS4 centrifugal coolant pumps.

35. Cutter Grinder

Gallmeyer & Livingston Co., 408 Straight Ave., Grand Rapids, Mich. Grand Rapids cutter grinder No. 62 power feed model.

36. Turret Lathes

Gisholt Machine Co., Madison 10, Wis. Masterline ram type universal turret lathes.

new literature..(Use reader service cards opposite pages 32 and 324 for free literature.)

37. Milling Attachments

Greaves Machine Tool Co., 2700 East-ern Ave., Cincinnati 2, Ohio. Full line of heavy-duty milling attachments.

38. Cylinder Mountings

Hanna Engineering Works, 1758 El-ston Ave., Chicago 22, Ill. Universal cylinder mountings to compensate for misalignment.

39. Taps

Hanson-Whitney Co., 173 Bartholo-mew Ave., Hartford 2, Conn. Taps, thread gages, hobs, centering machines, thread milling machines and cutters.

40. Rotary Surface Grinder

The Heald Machine Co., Worcester 6, Mass. Model 161 rotary surface grind-er, designed for maximum precision and economy on small work.

41. Hammers

Heller Tool Co., Newcomerstown, Ohio. Nail, machinists and special purpose hammers and hatchets.

42. Precision Grinders

The Hisey-Wolf Machine Co., Cincin-nati 8, Ohio. Precision grinders which now use grease instead of oil mist.

43. Live Centers

Ideal Industries, Inc., 1031 Park Ave., Sycamore, Ill. Complete range of live centers.

44. Electrical Equipment

Industrial Crane and Hoist Corp., 1536 South Paulina St., Chicago 8, Ill. Elec-trical equipment for cranes and mono-rail systems.

45. Jig Boring Machine

W. B. Knight Machinery Co., 3922 W. Pine Blvd., St. Louis 8, Mo. Jigmaster jig boring machine.

46. Furnaces

L & L Manufacturing Co., 136 Eighth St., Upland 71, Del. Co., Pa. Industrial furnaces and ovens.

47. Pins and Bushings

Lamina Dies & Tools, Inc., P.O. Box 31, Royal Oak, Mich. Guide pin bush-ings, guide pins, stripper guide pins and bushings.

48. Weldirectory

The Lincoln Electric Co., Cleveland 17, Ohio. Weldirectory for mild steel and low-alloy high-tensile steels; also iron powder and various other elec-trodes.

49. Feeding Equipment

F. J. Littell Machine Co., 4163 N. Ravenswood Ave., Chicago 13, Ill. Feeding equipment for punch presses and reels and straightening machines for coil stock.

50. Lathes

Logan Engineering Co., Lathe Divi-sion, 4901 W. Lawrence Ave., Chicago 30, Ill. Sixty-six models of screw cut-ting lathes and turret lathes of advanc-ed design.

51. Transmission Equipment

Lovejoy Flexible Coupling Co., 4800 W. Lake St., Chicago 44, Ill. Power transmission equipment.

52. Transmissions

Maurey Manufacturing Corp., Mau-reymatic Division, 2915 S. Wabash Ave., Chicago 16, Ill. Variable speed transmissions for equipment using vee drives up to 10 h.p.

53. Scrap Conveyor

May-Fran Engineering, Inc., 1708 Clarkstone Rd., Cleveland 12, Ohio. Chip-Tote automatic scrap conveyors to be used on any standard multiple-spindle or automatic machine tool.

54. Spray Gun

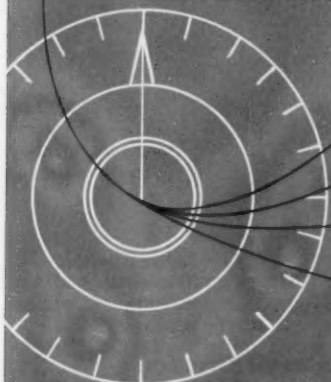
Metallizing Engineering Co., Inc., 1111 Prospect Ave., Westbury, L. I., N. Y. Metco ThermoSpray Gun does not use compressed air.

R and L TOOLS

your combination...

**TO LOWER COSTS ...
GREATER PROFITS!**

In this day and age of
AUTOMATION set-up time is a prime
cost factor. Cut your set-up time by
as much as 75% with R and L TOOLS.



R and L TOOLS are masterpieces of the tool-
maker's art ... guaranteed not to bend or
give way. Thousands of users attest that they
pay for themselves in no time!

R and L TOOLS
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TURNING TOOL • CARBIDE OR ROLLER BACKRESTS • RELEASING OR NON-
RELEASING TAP AND DIE HOLDERS, (ALSO FURNISHED FOR ACORN DIES)
• UNIVERSAL TOOL POST • CUT-OFF BLADE HOLDER • RECESSING TOOL •
REVOLVING STOCK STOP • FLOATING DRILL HOLDER • KNURLING TOOL



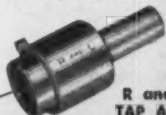
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TURNING TOOL ...**

changes in 10 seconds for right or left
turning, and replaces an assortment of
14 tools costing more than five times
that of one R and L Turning Tool.



**R and L
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TOOL ...**

Half the weight ... twice as efficient
as other knurling tools. One hex
wrench makes all adjustments.



**R and L
TAP AND
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New release mechanism makes right or
left threading possible ... on ex-
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**R and L
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Can be adjusted to operate on any
internal diameter within capacity of
machine ... Newly designed!

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PHILADELPHIA 40, PA.

- ☐ Please send me your new catalog
☐ Please arrange for no-obligation
demonstration of R and L TOOLS

NAME
COMPANY
ADDRESS

MM5-7

For more data circle 322 on Reader Service Card

July, 1956

modern machine shop 169

55. Speed Reducers

Michigan Tool Co., Cone-Drive Gears Division, 7171 E. McNichols Rd., Detroit 12, Mich. Standard Cone-Drive speed reducers for loads to 60 h.p.

56. Burr Blast Machines

Modern Industrial Engineering Co., 14230 Birwood Ave., Detroit 38, Mich. Burr-Blasters for removing fragmentary burrs from finish machined parts.

57. Fixture Details

Monroe Engineering Products, Inc., Monroe, Mich. Accurate, full size templates of assemblies.

58. Surface Grinders

Montgomery & Co., Inc., 7 Tichenor Lane, Newark 5, N. J. Different tools for use on surface grinders.

59. High Production Machine

The Morris Machine Tool Co., 934 Harriet St., Cincinnati 3, Ohio. Model 334-S high production machine processes housings at the rate of one every 30 seconds.

60. Electrical Standards

National Machine Tool Builders' Association, 2071 E. 102nd St., Cleveland 6, Ohio. A revised manual on Machine Tool Electrical Standards.

61. Folders and Brakes

Niagara Machine & Tool Works, Buffalo 11, N. Y. Air actuated and hand operated folders and brakes.

62. Tracing Template

Northwestern Tool & Engineering Co., 119 Hollier Ave., Dayton 3, Ohio. Tracing template giving 300 standard component parts for jigs and fixtures.

63. Metalworking Machines

O'Neil-Irwin Manufacturing Co., 576 Eighth Ave., Lake City, Minn. How Di-Acro metalworking machines perform a wide variety of forming, cutting, punching and notching operations in medium and light weight materials.

64. Milling Spindles

Pope Machinery Corp., 261 River St., Haverhill, Mass. Belt driven and motorized heavy-duty milling spindles.

65. Wheel Forming Attachment

Pratt & Whitney Co., Inc., 25 Charter Oak Blvd., W. Hartford 1, Conn. Model No. 10 universal Diaform wheel forming attachment.

66. Hole Punching Equipment

Punch Products Corp., 3800 Highland Ave., Niagara Falls, N. Y. Unitized punching and notching equipment.

67. Walkie Truck

The Raymond Corp., 88-140 Madison Ave., Greene, N. Y. New walkie truck with a capacity of 4,000 lb.

68. Dynamometer

George Scherr Co., Inc., 200-MM Lafayette St., New York 12, N. Y. Precision dynamometer for determining the force required to actuate delicate mechanisms.

69. Holding Tools

Seibert and Sons, Inc., Chenoa, Ill. Slip spindle assemblies, drill and tap drivers, spindle extension assemblies, adapters and turret toolholders.

70. Pedestal Grinder

South Bend Lathe Works, South Bend 22, Ind. Pedestal grinders, shaper and drill press.

71. Shelving

Standard Pressed Steel Co., Hallowell Division, Jenkintown 22, Pa. How to plan installations and order shelving.

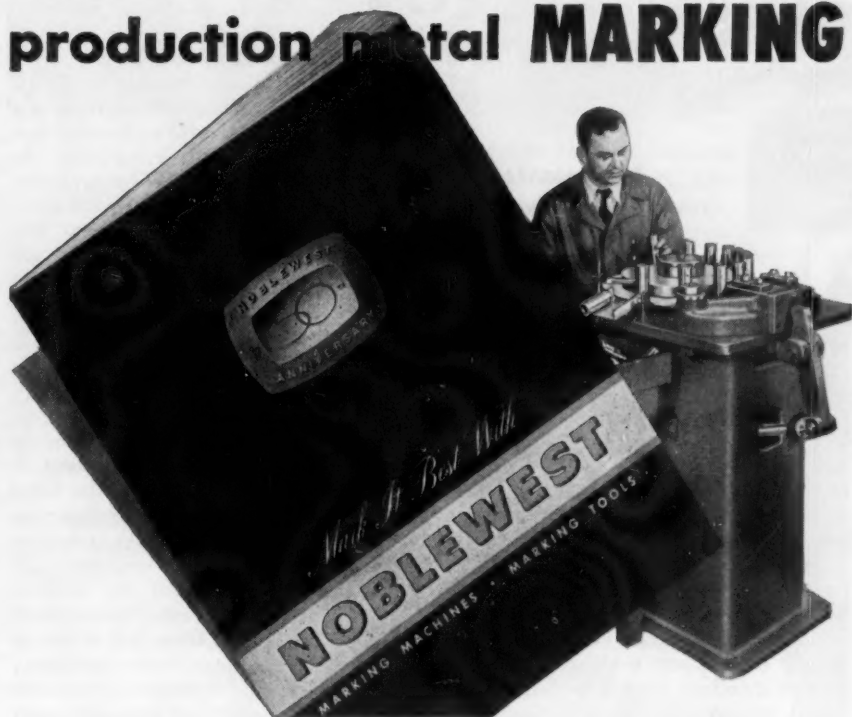
72. Torque Wrenches

P. A. Sturtevant Co., Addison, Ill. General principles of torque tools.

73. Oils

Sun Oil Co., Philadelphia 3, Pa. How to clean sludge out of hydraulic and lubrication systems without shutting down machines.

NEW GUIDE to modern production metal MARKING



BACKED BY
50 Years
Experience

**AS MASTERS OF
METAL MARKING**

For half a century NOBLEWEST has been solving industry's marking problems . . . designing and building equipment for faster, better, *permanent* marking of metal products at lower cost. Our new catalog contains the complete line of NOBLEWEST Marking Machines and Marking Tools including many new developments in better marking. For your copy, just send us your name and title on your company letterhead. Noble & Westbrook Manufacturing Co., 25 Westbrook Street, East Hartford, Conn.



For more data circle 323 on Reader Service Card

July, 1956

modern machine shop 171

news of the industry

**New plants and expansions . . . company
name changes . . . new appointments**

NORTON COMPANY OPENS NEW GRINDING WHEEL PLANT

Norton Company's new grinding wheel plant at Santa Clara, California, was officially opened recently with the beginning of a three day open house program. President Milton P. Higgins was host to editors of the technical press and newspapers who were invited to the opening event of the open house.

This plant, said to be the only one on the West Coast making a complete line of grinding wheels including diamond wheels, incorporates the latest

developments in the industry. These include many pieces of equipment and methods developed at Norton's main plant in Worcester, Massachusetts. Typical of these are the automatic electric tunnel kilns, which accurately control the temperatures of the kilns during firing; automatic molding machines for small diameter wheels, which insure complete uniformity of the size and density of the finished product; dust control equipment, which insures cleaner air than that which is found in the average home; and modern handling equipment, which reduces manual handling to a minimum.



Norton Company's new grinding wheel plant, located at Santa Clara, California

The lighting level throughout the plant is 40 to 60 footcandles at the working level. This uniformly high lighting level, combined with restful color combinations, eliminates glare and contributes to excellent working conditions. The plant is partially air conditioned, where the manufacture of the product requires uniform atmospheric conditions.

At the present time, about 80 people are employed at the Norton Santa Clara plant. Manufacturing began late in 1955 with the first available grinding wheels being produced in December.

★ ★ ★

MICHIGAN TOOL NAMES OFFICERS

Marvin R. Anderson is the newly elected president of Michigan Tool Company, succeeding Oscar L. Bard, who moves up to the position of chairman of the board. Mr. Anderson, son of one of the founders of Michigan Tool, has been with the company since 1935. He has been executive vice president for the last 12 years. For the last year, Mr. Anderson also has been presi-

dent of the American Gear Manufacturers Association. Mr. Bard, president of Michigan Tool Company since 1940, started with the company 40 years ago.

Michigan Tool Company is a large manufacturer of gear production equipment. The company has production plants in Detroit, Traverse City, Manistee, East Detroit, Michigan, and Windsor, Ontario, Canada.

**NOW AVAILABLE
IN DECIMAL SIZES!**

Schmarje

**CARBIDE STUB SCREW
MACHINE**

REAMERS



**FAST
DELIVERIES OF
THE EXACT SIZE YOU WANT!**

Better finish . . . greater accuracy
. . . lower tool cost! Write
today for specifications and prices.

SCHMARJE TOOL COMPANY

Carbide Reamers • Form Tools

MUSCATINE 3, IOWA

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news of the industry . . .

W. P. SNYDER, JR. RETIRES AS ACTIVE HEAD OF CRUCIBLE STEEL

William P. Snyder, Jr., chairman, Crucible Steel Company of America, Pittsburgh, Pa., recently announced to the board of directors his desire to be relieved of the active management of

the company's affairs, a position he has held since 1944. At the company's annual organization meeting, to be held at a later date, Crucible's president will become its chief executive officer. At that time, Joel Hunter, president since 1954, will assume the responsibilities of the general management of Crucible's activities. At the request of the board of directors, Mr. Snyder will continue as chairman, presiding at meetings and acting in an advisory capacity.

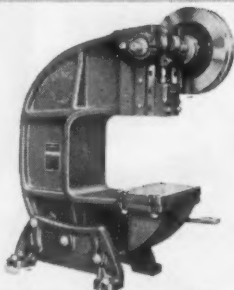
During Mr. Snyder's period of leadership as chief executive officer, the 56 year old specialty steel company has experienced a period of growth and modernization, which has come to be known in industrial and financial circles as "the rebirth of Crucible." After completing a post-war \$150,000,000 expansion and development program early this year, Crucible announced a second program of \$20,000,000, already underway, to expand capacities and improve facilities. Mr. Snyder, born in Pittsburgh, has been actively identified with the iron and steel industry for over 40 years. He is the son of the late W. P. Snyder, who, at the turn of

KENCO

1½ to 15 ton

PUNCH PRESSES

...dependable

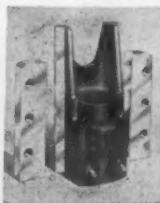


You get precision punching and high volume consistently with a Kenco press. It's built to eliminate downtime — with long-wearing parts and trouble-free assemblies. Needs adjustments seldom . . . replacements practically never. Write for literature.

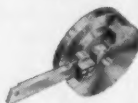
KENCO MANUFACTURING CO.

Mfrs. of Precision Machinery and Accessories

5211-A TELEGRAPH ROAD, LOS ANGELES 22, CALIFORNIA



Extra long ram ways permit full use of guiding area to insure precision punching.

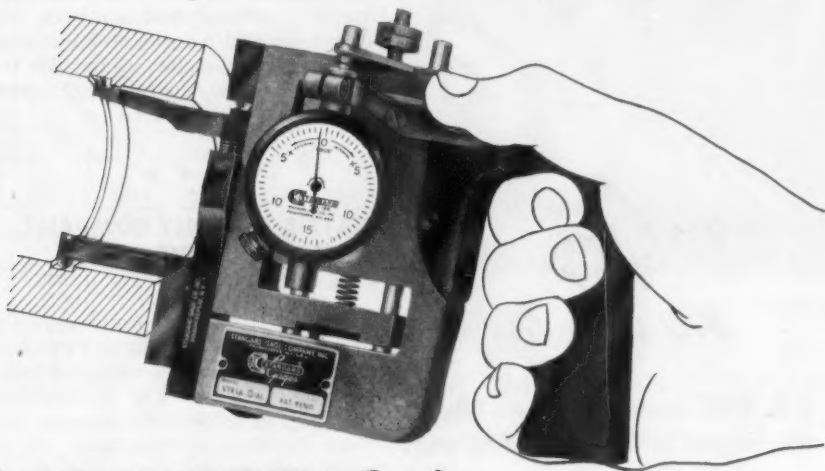


High strength castings used on clutch collar (illustrated), frame and ram ways — for extra rigidity and wear.

For more data circle 325 on Reader Service Card

**Easy to Operate
Easy to Read**

STANDARD Versa-Dial®



The **ONE** truly **ALL-PURPOSE** Dial Gage

This Versa-Dial is fitted with fingers to measure I.D. of grooves. Other fingers are stocked for various lengths of reach and for small I.D.'s. Contact tips can be finished for O-rings, snap rings or specials, as required.

Equipped with other kinds of fingers, Versa-Dial can check your internal or external THREADS for assembly quality, shallow COUNTERBORES for I.D., GEARS for pitch diameter, DOVETAILS and a host of SPECIAL SHAPES.

Write for details and prices to meet your specific needs

STANDARD GAGE COMPANY, INC.

MEASURING INSTRUMENTS FOR PRECISION INDUSTRY

124 PARKER AVE.



POUGHKEEPSIE, N. Y.

For more data circle 326 on Reader Service Card

July, 1956

modern machine shop 175



*Anywhere
on the map..*

**J. K. SMIT custom Diamond Wheels
are designed to fit your grinding needs**

You tell us your grinding problems. J. K. Smit engineers, located in all strategic cities, are trained and able to help you solve your job requirements.

We are proud of our reputation for integrity and ability . . . Our products reflect this reputation.

Send for your copy of our latest Diamond Wheel Catalog or contact us direct for further information



J. K. SMIT & SONS, INC.
HOME OFFICE AND PLANT
MURRAY HILL NEW JERSEY 215

For more data circle 327 on Reader Service Card
176 modern machine shop

news of the industry . . .

the century, was one of the leaders in the development of the iron ore, iron and steel industries.

Mr. Hunter joined Crucible in 1951 as vice president in charge of finance. He was elected a director and executive vice president in 1953. He succeeded to the office of president in May, 1954. Previous to joining Crucible, he was a partner in Haskins and Sells, Crucible's independent auditors, and as such devoted a considerable amount of his time to Crucible affairs. He is a native of Atlanta, Georgia, and a member of the Georgia bar.

★ ★ ★

**PRATT & WHITNEY COMPANY
NAMES EXECUTIVE
VICE PRESIDENT**

Edward P. Gillane, president of Potter & Johnston Company of Pawtucket, Rhode Island, has been elected executive vice president and a director of the Pratt & Whitney Company, Inc., West Hartford, Connecticut. At the same time it was announced that J. Potter Cunningham, vice president and sales manager of Potter & Johnston, a Pratt & Whitney subsidiary, was elect-



E. P. Gillane (left) and J. P. Cunningham

July, 1956

Compare

these **BEST BUY** Lempco
press prices with prices of
other producers:

Lempco Model No.	25M	50M	75M	100M	150M
Rated Tonnage	25	50	75	100	150
Press Operation	MANUALLY OPERATED				
*LEMPCO	\$315	\$440	\$550	\$1140	\$1200
Competitor "A"	370	631 ^a	679 ^b	(X)	1405
"B"	375	515	645	1430	1650
"C"	(X)	565 ^a	695	1365	1690
"D"	386	591	788	1541	(X)
Lempco Model No.	25 E-2	50 E-2	75 E-2	100 E-2	150 E-2
Rated Tonnage	25	50	75	100	150
Press Operation	2 H. P. PUMP UNIT				
*LEMPCO	\$825	\$875	\$1050	\$1720	\$1920
Competitor "A"	(X)	(X)	(X)	(X)	(X)
"B"	1430	1430	1650	(X)	2640
"C"	(X)	(X)	(X)	(X)	(X)
"D"	1147 ^c	(X)	(X)	(X)	(X)

Prices effective April 15, 1956 . . . F.O.B. Lempco Plant, Bedford, Ohio . . . Prices subject to change without notice.

NOTE:

HYDRAULIC PRESS PRICE COMPARISONS ARE FOR EQUAL OR CLOSELY SIMILAR SPECIFICATIONS. (X)—No Model Listed; a—60-Ton Listed; b—80-Ton Listed; c—30-Ton Listed. Entries Indicate Nearest Reasonably Equal Specification Known to be Offered. Prices and Specifications are Effective, to the Best of Our Knowledge, on or about April 15, 1956.



Model 50-E, 50-Ton Electrically Operated Hydraulic Press

Lempco Model No.	25 E-7	50 E-7	75 E-7	100 E-7	150 E-7
Rated Tonnage	25	50	75	100	150
Press Operation	7-1/2 H. P. PUMP UNIT				
*LEMPCO	\$1150	\$1200	\$1380	\$2050	\$2250
Competitor "A"	(X)	(X)	(X)	(X)	(X)
"B"	(X)	(X)	(X)	(X)	(X)
"C"	(X)	1586	1716	2428	2713
"D"	1375 ^c	1414	1623	2402	(X)

LEMPCO

INDUSTRIAL, INC.

WHERE *QUALITY* CONTROLS

news of the industry . . .

ed president of Potter & Johnston to succeed Mr. Gillane.

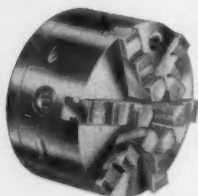
Mr. Gillane has been associated with Potter & Johnston since 1948, first as vice president and controller. He became general manager of the company in 1950 and president and general manager last year. Earlier, for a period of

27 years, he occupied many important executive positions with the Underwood Corporation. Being a resident of Bridgeport, Connecticut while associated with Underwood, he was active in civic affairs of the city. From 1938 to 1940 he was Civil Service Commissioner of Bridgeport and a part time teacher of economics at the State Trade School. Also, he is a past president of the Bridgeport Chapter of the

National Association of Cost Accountants. He is a director of Potter & Johnston Company and a trustee of the Memorial Hospital in Pawtucket.

Mr. Cunningham, new president of Potter & Johnston, has been associated with the company since 1915. A native of Pawtucket, Rhode Island, he attended the public schools there and the Rhode Island School of Design in Providence. After a period as a trainee with the company and service with the U. S. Navy, he became a sales representative for the company and was made vice president and sales manager in 1938. In 1941 Mr. Cunningham was elected a director of the company.

compare HORTON Tru-Set FEATURES



- Repetitive accuracy to .0002" T.I.R. guaranteed
- Rugged Meehanite bodies guaranteed for life
- Instant peripheral location - 3 operating pinions
- Available up to 12" in both 3 and 6 jaw styles
- Packed in reuseable airtight metal containers

compare HORTON Tru-Set PRICES

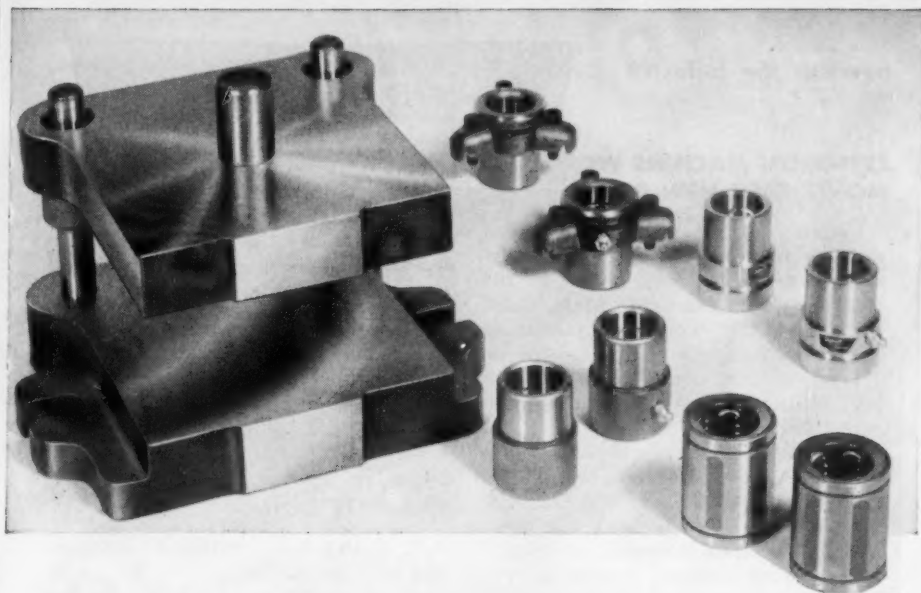
SIZE	MODEL	NET PRICE
5	5T6	86.35
6	6T6	120.65
8	8T6	167.65
10	10T6	247.65
12	12T6	298.45

Chucks listed above are 6 jaw universal type with two sets of jaws. See your Horton Distributor or write direct for new Net Price Selector



HORTON CHUCK
WINDSOR LOCKS, CONN.

For more data circle 329 on Reader Service Card



Which BUSHING SHOULD YOU USE?

Your choice is getting broader every day. Each of the guide pin bushings above is good—in the right application. But, some of them cost more than others. Which should you use for best results consistent with cost?

That's where Detroit Die Set can help you. In our 25 years of exclusively building die sets, we've tested a good many types of bushings. Based upon these tests and performance in our customers' plants, we stock and recommend a number of types of bushings for use in our die sets.

To aid you in bushing selection, we've prepared a bulletin on the subject. Just ask for Bulletin 56, and we'll send your personal copy without delay. Detroit Die Set representatives also will be glad to personally aid you in selecting the right bushings and die sets. They're as near as your 'phone.

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Detroit
DIE SET
CORPORATION

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DETROIT 2, MICHIGAN

For more data circle 330 on Reader Service Card

CRITERION MACHINE WORKS MOVES INTO NEW PLANT

Criterion Machine Works marked their twenty-first year in business by moving into their new plant at 765 West Sixteenth St., Costa Mesa, Calif. The new plant, which occupies more than 15,000 square feet, is located on a two-acre plot, providing good parking facilities, plus room for future plant expansion.

An industrial engineered color layout, acoustical tile ceilings for noise-level control, over 100-foot candle light level throughout the work areas and piped-in music, all contribute to good working conditions. The plant layout is set up for an efficient operation from raw stock to finished products in the Criterion line, plus the necessary flexibility for aircraft and similar job work which, at present, constitutes about fifty per cent of the production. The company is now operating two shifts on a 45-hour week.

Close quality control is possible since, other than heat-treating, all operations are completed in the plant. All precision grinding and inspection is done in temperature controlled and air-conditioned enclosures.

Starting as an experimental shop, Criterion soon entered the tool manufacturing phase of the business, and now builds a line of boring heads, boring tools, bars, holders and toolmakers vises. These various tools have national distribution, as well as some foreign sales.

★ ★ ★

T. J. PETERSON

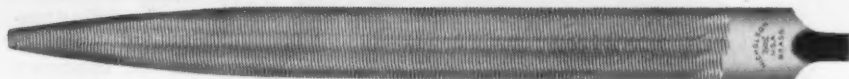
T. J. Peterson, president and founder of Tamms Industries, Inc., Chicago, Illinois, formerly Tamms Silica Company, died recently at the age of 82 in Evanston, Illinois, after an illness of two years. Mr. Peterson founded Tamms Silica Company in 1911 and had successfully headed the company in its succeeding 45 years of continuing growth and expansion.



New Plant of Criterion Machine Works located at 765 West Sixteenth Street, Costa Mesa, California. The above illustration shows the toolmakers' work area of the new plant.



POP'S School of Filing



The Right File for the Job pays off in faster cutting, longer wear and better, smoother work. There are Nicholson Special Purpose files for Aluminum, Brass, Lead, Stainless Steel and other hard-to-work materials, for Foundry and Die Casting work, plus Swiss Patterns in hundreds of shapes and sizes for all kinds of precision filing.

These are "specialist" files. And they're made by a "specialist" company. Nicholson File Company has been making files — and nothing but files — for more than 92 years. Carefully. Conscientiously. With unremitting research and development to keep pace with the filing requirements of industry.

Most of "Pop's" knowledge of file care, selection and use is in the 49-page "text-book," *File Philosophy*. It may pay you to write for your **FREE** copy today.



NICHOLSON FILE CO.
Providence, R.I.



(In Canada: Nicholson File Company of Canada Ltd.,
Port Hope, Ontario)

NICHOLSON FILES
A FILE FOR EVERY PURPOSE

For more data circle 331 on Reader Service Card

July, 1956

modern machine shop 181

news of the industry . . .

CLIPPER COMPANY MOVES

Clipper Diamond Tool Co., Inc., has moved to larger quarters at 345 Hudson St., New York 14, N. Y. The new premises provide more than three times the present area and will be air-condi-

tioned. An expanding research program is to be backed up by a fully equipped, modern laboratory with last-word facilities. The new plant will house the most up-to-date equipment. The working force will be augmented accordingly.

Joe Klipper, vice president and general manager, is the third generation of his family in the diamond business. Clipper's business is claimed to have

tripled in the past five years. The increase was felt throughout the line of Clipper products, which include diamond dressers, boring tools, improved tungsten carbide impregnated tools, resin, metal and vitreous bonded diamond wheels. An item which has attracted attention is the Cera-Met bonded diamond wheel, a novel bonding material designed to afford efficiency for general purpose off-hand grinding of carbide materials.

KEEP YOUR MACHINES LEVEL



With

EMPCO

leveling jacks!

For peak efficiency and longer life, level your machines with EMPCO Jacks! Easily installed and re-located, EMPCO Jacks provide quick, easy machine set-ups *plus* smooth, positive adjustment! Used with VI-SORB mounting pads, Empco jacks control vibration, reduce noise, prevent creepage and cut machine maintenance costs! In many cases they eliminate the need of anchor bolts in installations.

Available in six styles and 25 models, Empco's are designed to meet your requirements. Write today for complete information and illustrated bulletin!



THE ENTERPRISE MACHINE PARTS CORPORATION

2715 JEROME AVENUE • DETROIT 12, MICHIGAN

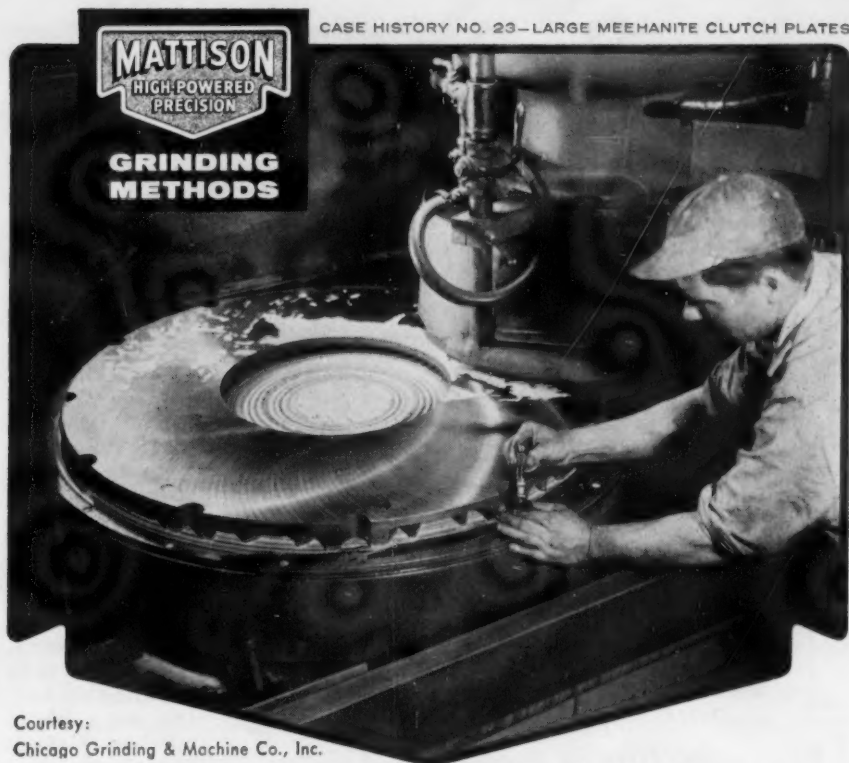
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182 modern machine shop



Joe Klipper

July, 1956



Courtesy:
Chicago Grinding & Machine Co., Inc.

How Mattison "Power-Designed" Vertical Rotaries are grinding more, different jobs faster!



Hardened steel retainer rings, .375 in. thick, are finish-ground, holding depth of counterbore. Stock removal is .030 in.

These jobs show the wide range of work you can do on a Mattison. At the top, Meehanite clutch plates are finish-ground in 20 minutes each, holding size within .002 in. The plates have a 12½ in. friction surface, but the 60 hp spindle motor assures heavy stock removal, high unit pressures, and free-cutting action.

Left, two sides of retainer rings are ground at the rate of 100 per hour, holding size to plus .000 minus .003 in. Ask about the new features of Mattison Nos. 24 and 36 Vertical Rotaries.

Mattison Machine Works, Rockford, Ill., U. S. A.



HIGH-POWERED
PRECISION
SURFACE
GRINDERS

For more data circle 333 on Reader Service Card

news of the industry . . .

NOBLEWEST ELECTS OFFICERS

The Noble & Westbrook Manufacturing Co., East Hartford, Conn., has elected the following officers: William C. Westbrook, chairman of the board; G. Edgar Westbrook, president; Howard B. Noble, vice president and treasurer; Christine E. Super, secretary; H. Clinton Noble, assistant vice president

and assistant secretary; G. Warren Westbrook, assistant vice president and assistant treasurer; and Richard H. Gunther, assistant secretary. Mr. Gunther is a newly elected director.

★ ★ ★

OWENS COMPANY TO MANUFACTURE B & S ATTACHMENT

Henry Owens & Co., Inc., 51 Washington Ave., Cranston 7, R. I., is now

manufacturing a 616 cylindrical grinding and indexing attachment, which was formerly manufactured by Brown & Sharpe Manufacturing Company. This attachment is used for dry grinding small cylindrical work, tapers and work requiring indexing on surface grinders. Grinding is done on dead centers. Work driving dogs with specially designed driving arms hold work without backlash, when indexing is required. For work not ground between centers, an indexing spring chuck with spring collets is available. The motor is completely enclosed; bearings in index head and chuck are permanently oiled.



PAT. PENDING

**STOPS
PIPE THREAD
LEAKS
instantly!**

Prevents future leaks!

TRU-O-SEAL does away with messy pipe "dope" compounds, eliminates damage caused by overtightening of conventional leaky joints, and is immune to ALL known hydraulic fluids and to steam, air, water, solvents, and practically all gases and chemicals. It withstands temperatures from -100° F. to plus 500° F., saves cost and labor of special or welded fittings, and has been fully field tested and proven by leading manufacturers. Comes in $\frac{1}{8}$ " to $2\frac{1}{2}$ " pipe thread sizes.

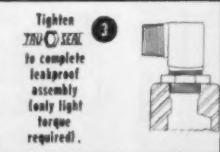
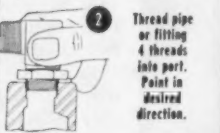
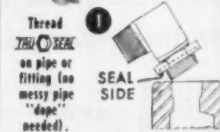
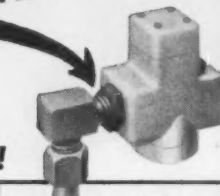
Write for data and prices

TRU-O-SEAL

DIVISION
Flick Reedy Corporation

2024 N. Hawthorne Melrose Park, Ill.

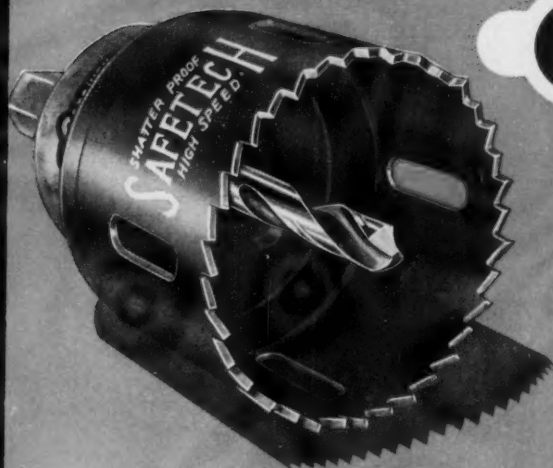
"Miller Fluid Power" is also a Div. of Flick-Reedy Corp.



For more data circle 334 on Reader Service Card

and now...

stop



CAPEWELL

SHARPER PROOF
SAFETECH
HIGH SPEED

hole SAWS

Now the famous Capewell line of Metal Cutting Saws has been joined by Capewell High Speed Safetech Hole Saws... manufactured to the same high standards as Safetech "Power Hack Saw Blades"... a high speed cutting edge with a soft, tough flexible back to give safe, fast cutting in even the toughest materials. Thousands of users know that Safetech Blades stay sharper longer and give more cuts per blade dollar.

Safetech Hole Saws are available from your industrial distributor in diameters ranging from $\frac{1}{16}$ " to 6". All sizes have six teeth per inch and are equally well suited for cutting sheet, plate or curved sections. Interchangeable arbors with adjustable pilot drills fit chucks from $\frac{1}{4}$ " to $\frac{3}{4}$ ". You will find that Safetech Hole Saws are an economical means of extending the useful range of portable power tools, lathes, drills, and production line work.

CAPEWELL'S LINE OF OTHER FINE TOOLS



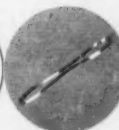
**HAND
HACK SAW
BLADES**



**HACK SAW
FRAMES**



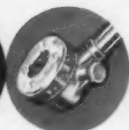
**POWER
HACK SAW
BLADES**



**BAND SAW
BLADES**



HAMMERS



**PIPE
FITTERS'
HAND TOOLS**



**GROUND
FLAT TOOL
STEEL**



WRENCHES

SOLD ONLY THROUGH
CAPEWELL DISTRIBUTORS
who provide: complete inventory
... engineering assistance
... delivery when you need it.



THE CAPEWELL MANUFACTURING COMPANY
Hartford 2, Connecticut

Please send complete details on Capewell Hole Saws to:

NAME _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

news of the industry . . .

ONSRUD ELECTS OFFICERS AND BOARD OF DIRECTORS

At the annual meeting of stockholders and board of directors of Onsrud Machine Works, Inc., Niles, Illinois, officers and the board of directors were elected for the coming year. New offi-

cers elected include Albert L. Breuer, vice president in charge of machine tools sales; Robert M. Miller, vice president in charge of woodworking machinery sales; Earl Pankonin, vice president in charge of engineering; and John F. Andrews, comptroller. Advanced were G. M. Campbell from vice president and secretary to executive vice president, and John M. Wilken from assistant secretary to secretary.

Re-elected were R. F. Onsrud, president; Frank H. Lamson-Scribner, assistant to the president; C. F. Jacobson, vice president; and H. R. Krabol, company treasurer.

Re-elected to the board of directors were R. F. Onsrud, president, and G. M. Campbell, H. R. Krabol, Charles R. Onsrud, Albert L. Breuer and Earl Pankonin. Newly elected was Robert J. Burdett, who is attorney for the corporation.



FEATURES

Large Capacity
Semi-Portability
Versatility
3-point Suspension
Operational Safety
Centralized Controls
Speed—Accuracy
Lowest Cost

- The finest metal cutting band saw available . . . and at the lowest price. The big, rugged Johnson Model J easily handles 10" rounds, 18" flats—automatically. A brute for work,
- the versatile Model J is available in standard wet or dry models. See for yourself how much time, labor and money you can save with a Johnson saw.

Johnson MANUFACTURING CORPORATION
• Main Plant—1011 Barnes St.
• Albion, Michigan

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186 modern machine shop



R. F. Onsrud

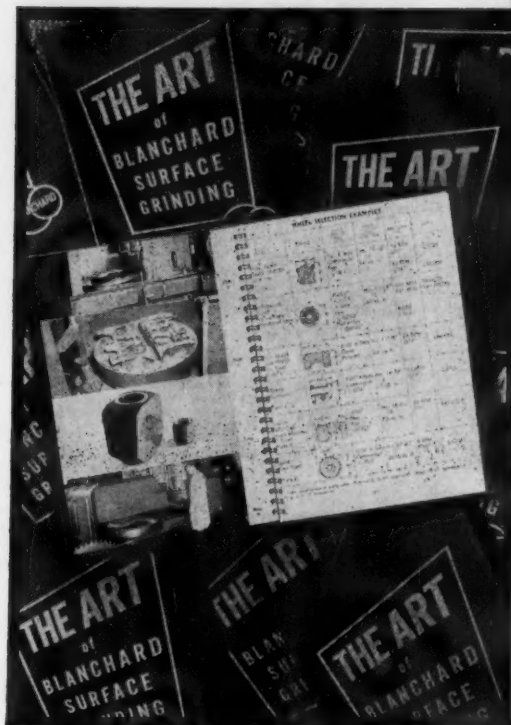
July, 1956

FREE!

Page after page shows
the correct abrasive wheel to use
(for the best Blanchard grinding results)



Blanchard wheels in silicate, resinoid and vitrified bonds.



This is our famous booklet *The Art of Blanchard Surface Grinding* — brought up-to-date with a third edition. It contains complete descriptions of our silicate, resinoid and vitrified bonded wheels. It also describes a number of jobs and shows you how to select the correct wheel for each job. Every Blanchard operator should have a copy handy — send for yours today.

Blanchard wheels are guaranteed for uniformity of grade. They're best for Blanchard grinders, best for every job. They give you maximum production, utmost economy . . . whether the work is tough as copper or fragile as glass, whether it requires heavy roughing cuts or precision grinding within .000010" of absolute flatness and surface finish of 1 micro-inch.

PUT IT ON THE



THE BLANCHARD MACHINE COMPANY

44 STATE ST., CAMBRIDGE 39, MASS.

For more data circle 337 on Reader Service Card

THE BLANCHARD MACHINE CO.
64 State St., Cambridge 39, Mass.

MMS

Gentlemen:

Please send me a free copy of "The Art of Blanchard Surface Grinding" (3rd Edition).

NAME

FIRM

STREET

CITY.....ZONE.....STATE.....

July, 1956

modern machine shop 187

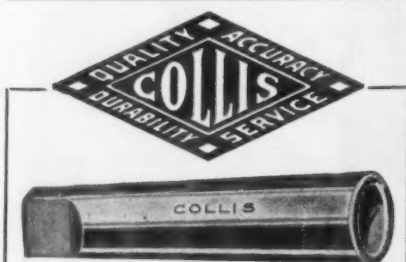
news of the industry . . .

CINCINNATI MILLING MACHINE COMPANY ELECTS OFFICERS

At the recent organization meeting of the directors of the Cincinnati Milling Machine Company, Cincinnati, Ohio, Walter W. Tangeman, executive vice president since 1934 and now in



W. W. Tangeman (left) and Swan E. Bergstrom



STANDARD TYPES

S L E E V E S
AND
S O C K E T S

NOW!
HEAT TREATED . . .

So popular with users.

COLLIS Heat Treated Sleeves and Sockets are manufactured by skilled workmen to give long durable service and extra long life. This type of sleeve has less chance of nicks and assures same accuracy with longer runs.

Call at once for our representative to explain about the Complete Collis Line of Lathe Centers, Arbors, Drill Drifts, and Magic Type Chucks as well as Sleeves and Sockets and Collis.

"Call Collis for Service"

THE COLLIS CO.

DEPT. A, CLINTON, IOWA

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188 modern machine shop

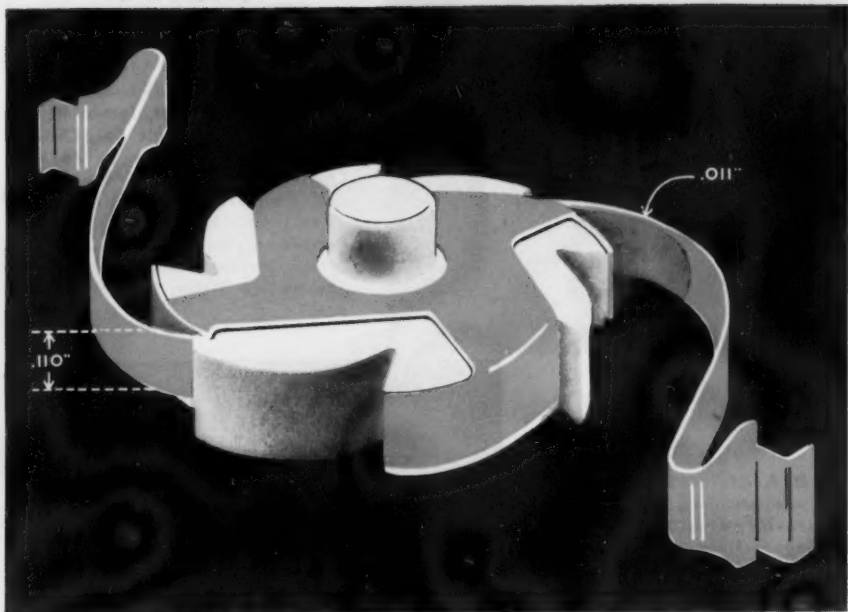
his 48th year with the company, was elected chairman of the board of directors. Swan E. Bergstrom, who joined the company in 1927, became vice president in 1949 and manager of the Machine Tool Division in 1954, was named executive vice president. F. V. Geier continues as president. Other officers that were re-elected are: C. F. Roby, H. A. Gay and Millard Romaine, vice presidents; F. M. Angevin, treasurer; and P. H. Cone, secretary.

★ ★ ★

SUPERIOR BRASS WORKS EXPANDS

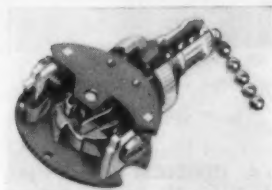
Superior Brass Works, 312 S. Crawford St., Detroit 17, Mich., manufacturer of bronze bushings, has been modernizing its plant over the past several years. Included in this program is modernization of the company's foundry facilities, as well as the machine shop. For the latter, two special advanced design high production machine tools have been acquired; these machines being designed for bushings having an inside diameter range of from 2 to 5½ inches. According to company officials, the machines will produce 13 micro-inch finishes at tolerances of plus or minus 0.00025 inch.

July, 1956



Enlargement showing the contact springs at the "heart" of one model of the Levolver® switch mechanism. Levolver switches are used in industrial and commercial lighting, in heavy-duty industrial sockets, in appliances, fixtures, etc.

The Anaconda alloy tailored for this punishing service actually costs less



Cutaway of Levolver Switch No. 41 shown approximately actual size.

THE PROBLEM: The McGill Manufacturing Company, Inc., Valparaiso, Indiana, was interested in a desirable substitute for a premium copper alloy used in contact springs for their widely known Levolver switch mechanisms. Unexcelled quality had to be maintained with a new alloy that would help hold prices against rising costs. As these switches are designed for long service and heavy-duty

industrial service, the spring material has to be tough and durable.

THE SOLUTION: In 1952, McGill discussed the problem of an alternate spring material with a metallurgical engineer from The American Brass Company. After an analysis of the requirements, a special Anaconda alloy was offered—Ambronze-422, rolled to spring temper.

Samples were prepared and tested by McGill and Underwriters' Laboratories. The material performed satisfactorily in standard tests—current carrying capacity, 6 amps at 125 volts d.c.—readily exceeded the requirements of 75,000 cycles, or 150,000 individual operations.

In production, the new Anaconda alloy also performed satisfactorily. It was necessary to make only one minor die-

forming change. McGill received a desirable saving in material costs—product quality remained high—and the material was available as needed to maintain production.

FREE TECHNICAL SERVICE: This is another example of the Anaconda technical service available to metal users. Sometimes a new alloy is required—other times a variation of a standard alloy will do the job. The Technical Department of The American Brass Company, through its day-to-day work with a wide variety of metal problems, offers a tremendous breadth of experience, which is at your disposal. See your American Brass Company representative or write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ontario.

ANACONDA® **COPPER AND COPPER ALLOYS**

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New Officers Elected at Mill Supply Meeting

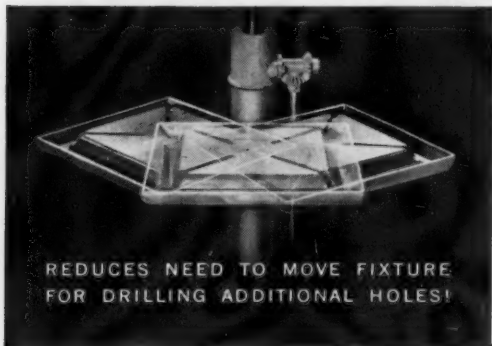
A. S. M. A. OFFICERS: (left to right) second vice president, Lyman H. Bellows, Sheldon Machine Co., Chicago, Ill.; president, Charles T. Jordan, Charles Parker Co., Meriden, Conn.; first vice president, Robert L. Hamilton, Dumore Co., Racine; treasurer, Lewis Bernard, Jr., Lufkin Rule Co., Saginaw, Mich.; secretary, Fred C. Emerson, Spartan Saw Works, Springfield, Mass.

S. I. D. A. OFFICERS: (left to right) first vice president, A. V. Davies, Moore-Handley Hardware Co., Birmingham, Ala.; president, Ashley DeWitt, Briggs-Weaver Machinery Co., Dallas, Texas; second vice president, H. B. Tonsmeire, Turner Supply Co., Mobile, Alabama.



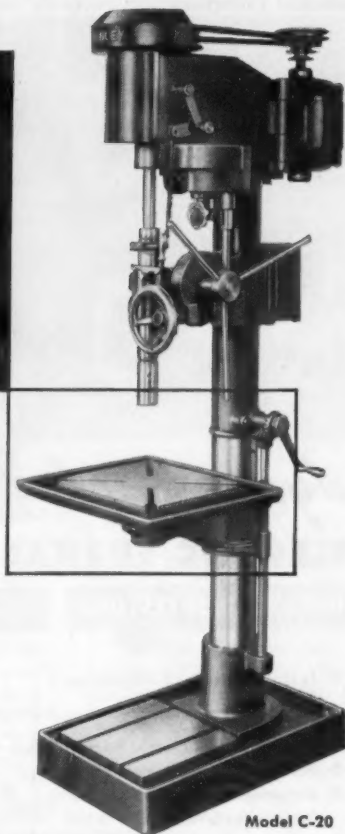
N. I. D. A. OFFICERS: (left to right) president, Frank M. Cruger, Indiana Manufacturers Supply Co., Indianapolis, Ind.; second vice president, John W. Failing, The Chas. A. Strelinger Co., Detroit, Mich.; (missing from picture) first vice president, Samuel H. Clark, Samuel Harris & Co., Chicago.

Sibley Table Swing Saves Set-up Time!



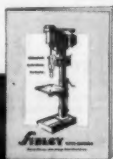
Lick largest cost item in tool-room, die shop—or small lot production! Rapid positioning by rotating table arm overcomes need to change set-up.

- Geared power feeds. Dial selection.
- Back gears for extra power.
- Drills 1 1/4" in steel plate.
- Accurate. Rugged. Convenient controls. Eight spindle speeds.
- Sensitive for "feel" of job.
- 20" swing. 2 h.p. motor.



Model C-20

Send for



Free Catalog!

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MACHINE & FOUNDRY CORP.
SOUTH BEND, INDIANA

SIBLEY MACHINE & FOUNDRY CORP.
Dept. MMS-7, South Bend 23, Indiana
Send Catalog No. 67

Name _____ Title _____
Company _____
Address _____
City _____ State _____

For more data circle 340 on Reader Service Card

industry news in brief . . .

The St. Louis sales office of **The Dow Chemical Company** has recently moved to new quarters, located at 10 South Brentwood Boulevard, St. Louis 5, Missouri. Manager of this office is **Glenn H. O'Neal**. The office handles general chemicals, plastics, magnesium and agricultural chemicals.

Sidney B. Wetherhead appointed manager of distributor sales promotion, **Norton Company**, Worcester, Massachusetts. **Elliot D. Linton** named merchandising engineer upon the retirement of **Robert H. Cannon**.

Robert S. Robinson named administrative assistant to the vice president in charge of sales, **Allegheny Ludlum Steel Corporation**, Pittsburgh, Pennsylvania. **Fred W. Kieshauer** named product manager—magnetic laminations. **Joseph A. Kennedy** named administrative staff assistant—sales division.

Roger M. McCray appointed sales manager, **Kennametal, Inc.**, Latrobe, Pennsylvania. **Harry C. O'Brien** in charge of operations for **Kennametal Overseas Corp.**

Taze and Hewitt named district sales representative in the state of Maryland, **Toritt Manufacturing Company**, St. Paul, Minnesota. **Union Supply Company** named district sales representative in Colorado and eastern Wyoming, and **Byron Confer** named district sales representative in southern Indiana and Ky.

New!
Incomparable!

dyna-trol **ELECTRIC FURNACES**



COMPARE THESE FEATURES

- Infinite Zone Control to 2000° and 2300°F
- Zone temperature indication by Pyrometer Selector Switch
- Porcelain Element Holders
- Automatic Hold and Cut-off instrument available
- Infinite Variety of Time-Temperature Curves Obtainable
- Rugged Construction. Highest quality insulation used.

COMPARE THESE PRICES

Firing chamber (H. W. D.)	Semi-Auto. prices	Auto. prices
6"x12"x12"	\$295.	\$432.
12"x12"x12"	\$405.	\$550.
9"x 9"x18"	\$480.	\$625.
14"x14"x14"	\$525.	\$680.
20"x20"x20"	\$975.	\$1140.
18"x18"x36"	\$1125.	\$1375.
(To 2000° Maximum Temp.)		

Over 40 Standard Models — Write for complete literature

L & L

INDUSTRIAL DIVISION
MANUFACTURING CO.
CHESTER 71, PA.

For more data circle 341 on Reader Service Card



Wilson "Rockwell"* Hardness Testers

**Is HARDNESS
an important factor
in your business?**

• If your business involves metals or, in many cases, plastics, successful operation often requires *exact* knowledge of the proper hardness of the materials you make or work with.



IN HEAT TREATING DEPARTMENTS—

WILSON "ROCKWELL" testing of hardened and tempered steels is almost universal. This is especially true for plain carbon and alloy steels. It is as easily done by a production worker as a metallurgist.

IN METALLURGICAL LABORATORIES—

They provide means for establishing thousands of hardness specifications. Their use insures quality of product, reduces defects and maintains good name and reputation.

IN TOOL ROOM OR PRODUCTION

They are relied upon for absolute guidance as to the hardness of tools and the metals to which they are applied. They are also ideal for production testing. Each test may take as little as 3 to 5 seconds.

• For complete information on WILSON "ROCKWELL" Hardness Testers call or write today. There is a WILSON model to meet every testing requirement.

**Trademark registered*

ACCO



**Wilson Mechanical Instrument Division
AMERICAN CHAIN & CABLE**

230-G Park Avenue, New York 17, N. Y.

For more data circle 342 on Reader Service Card

July, 1956

modern machine shop 193



Industry news in brief . . .

Grant S. Wilcox named plant manager, Ross Operating Valve Company, Detroit, Michigan.

Francis H. Wemple elected director, Handy and Harman, New York, N. Y.

Lee Horneyer Company appointed new representative for eastern Missouri and southern Illinois, Reed Rolled Thread Die Company, Worcester.

Douglas Graham appointed product manager of abrasives division, Elgin National Watch Company, Elgin, Illinois. Arthur Leaver and John Wizarde appointed sales engineers in the Chicago, St. Louis and Cleveland areas.

Robert W. Miller has become associated with the Process Machinery Division, The Cincinnati Milling Machine Company, Cincinnati.

Victor R. Schultz appointed export manager, The DoAll Company, Des Plaines, Illinois.

Parker Wheeler appointed sales manager, felt products division, The Felters Company, Jackson, Michigan.

Benjamin E. Storrs appointed carbide cutting tool specialist, Carboly Department, General Electric Company, Detroit, Mich. Jack A. Yoblin appointed carbide products engineer.

NEW

FOSTORIA

20th Anniversary

LOCALITES

FLEXIBILITY OF A THOUSAND POSITIONS

Light as you want it for
Machine tools, assembly,
inspection.

\$7.90
EACH
in std.
pkg. of 4
List \$9.30 ea.

MODEL 55-BH-701



NEW Universal Arm Joints — Bend 150°. Large frictional triple disc bearing surface. Smooth, easy movement. Instantly adjustable by hand to direct light exactly as needed.

NEW Collar Disc Joints — Rotate 180°. Combination of 135° bend joints and 180° rotating joints provides amazing articulation for positioning reflector.

NEW Reflector — Deep pear shape design with 5" x 3 3/4" orifice. Accommodates 100 watt A-21 or smaller lamp.

NEW Base — Universal for horizontal or vertical mounting. Outlet box base optional.

NEW Wiring — Heavy duty Levolver switch socket interior in high impact plastic shell with Velumoid lamp seal. 8 ft. SPT-2 18/2 heavy duty plastic rip cord with molded plug.

NEW Finish — Semi-gloss Vista Green baked enamel. Reflector interior, high temperature White.

Also Available with one arm

WRITE for Complete Catalog of Localite models for every industrial use.



THE FOSTORIA PRESSED STEEL CORPORATION, Fostoria, Ohio
Localities are available through wholesalers everywhere.



For more data circle 343 on Reader Service Card

Edward C. Hanus reappointed personnel manager, **Osborn Manufacturing Company**, Cleveland, Ohio.

George J. Carvalho appointed general manager, **Jarvis Power Tools, Inc.**, Middletown, Connecticut.

Wetzel Tool Company, East Hartford, Connecticut, and **Jack E. Dustman and Associates** appointed sales representative for **Diamondite Products Division, United States Ceramic Tile Company**, Canton, Ohio.

Harry B. Wheeler appointed credit manager, **Warner and Swasey Company**, Cleveland, Ohio.

Chester C. Lonsdale named assistant to superintendent of pressed steel division, **Standard Pressed Steel Company**, Jenkintown, Pa.

David A. Wallace elected vice president in charge of sales, **Cincinnati Lathe and Tool Company**, Cincinnati, Ohio. **E. L. Ritter** elected vice president in charge of engineering.

Robert M. Simpson appointed manager, Los Angeles sales branch office, **Crucible Steel Company of America**. **Kenneth M. Acton** appointed manager, San Francisco sales branch.

Leonard A. Rafferty appointed manager of the Pittsburgh office, **The Motch and Merryweather Machinery Company**, Cleveland, Ohio.

EFFICIENT-LOW COST

Dust Collection

Easy installation . . . efficient low-cost operation . . . simplified maintenance, make **Dustkop FIRST** among equipment to collect most all industrial dusts. There are **Dustkop** models to eliminate your dust problems . . . that are space saving, self-contained units, or exhaust type for rafter, ceiling or outside location. Write for descriptive literature.



37 STANDARD MODELS
TO CHOOSE FROM
• READY TO USE

Also a Complete Line of Mist Collectors

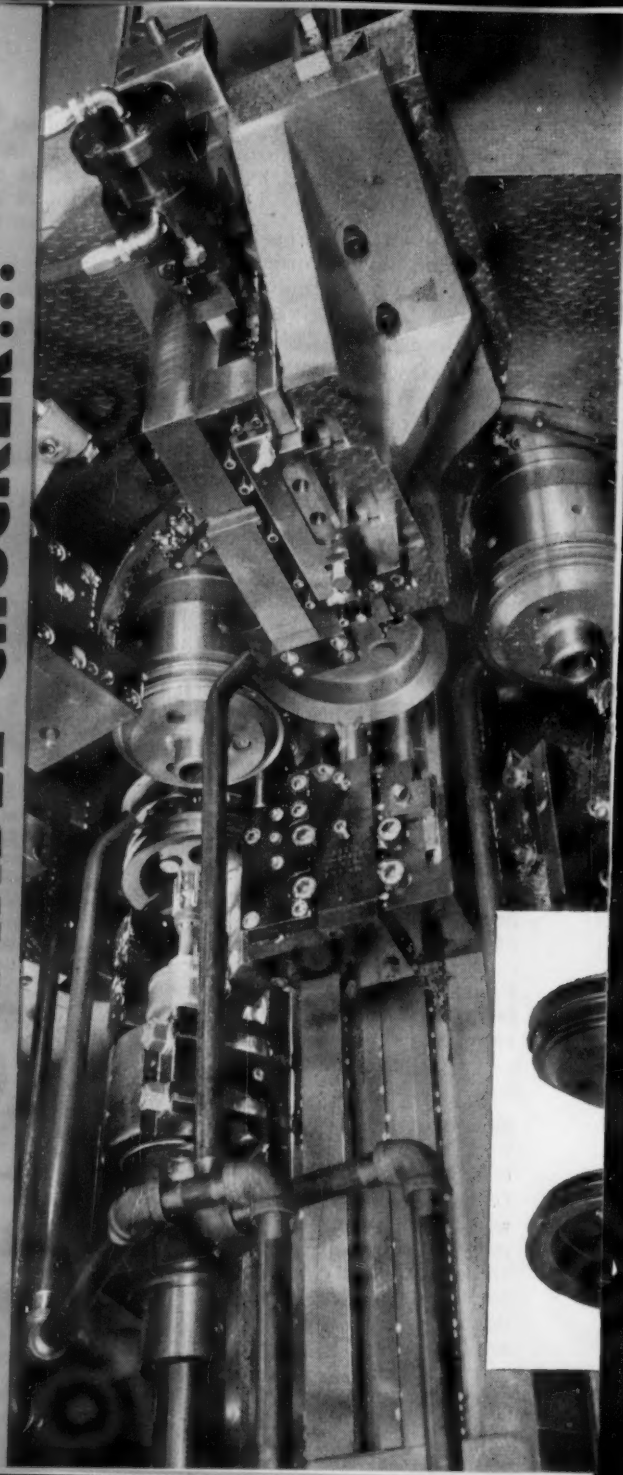
AGET MANUFACTURING COMPANY
1398 E. CHURCH ST. • ADRIAN, MICHIGAN

For more data circle 344 on Reader Service Card

with an

Acme-Gridley

8 SPINDLE CHUCKER...





JOB FACTS

Piece—Motor Sheave

Material—Cast iron $3\frac{1}{2}$ " long, $7\frac{3}{8}$ " diameter

Operations—Machine arranged for double indexing to complete both ends of piece simultaneously, 26 operations (13 on each end) including skiving. Carbide tooling used throughout.

Machine Time—49 seconds

Machine—8 inch spindle Acme-Gridley chucking automatic.

Ask for our representative to tell you more about Acme-Gridley BASIC DESIGN. Meanwhile write for Bulletin CM-44 showing 25 different tooling setups on chucking jobs.



you get *these* advantages

Maximum production, at lowest cost per piece, is assured because of:

GREATER TOOLING FLEXIBILITY . . . the result of Acme-Gridley sound *basic* design.

DOUBLE INDEXING . . . which lets you finish *both* ends of the piece *at one time*, more accurately, with less handling—as fast as modern tools can take it.

INGENIOUS TOOLING ENGINEERING . . . that comes *only* from COMPLETE LINE experience.

National Acme

THE NATIONAL ACME COMPANY, 183 EAST 131ST STREET, CLEVELAND 8, OHIO

SALES OFFICES: • Newark 2, New Jersey • Chicago 6, Illinois • Detroit 27, Michigan

Industry news in brief . . .

Anthony J. Pelson appointed assistant sales manager in charge of distributor sales, **Continental Screw Company**, New Bedford, Massachusetts.

Gordon W. Smithson named vice president and chief engineer, **Potter and Johnston Company**, Pawtucket.

John A. Marsh named vice president in charge of air and hydraulic sales, **Rivett Lathe and Grinder, Inc.**, Boston.

Albert J. Fischer appointed works manager, **Adamas Carbide Corporation**, Kenilworth, New Jersey. **Michael J. Kniola** named production manager.

John G. Frischkorn appointed district sales manager, **Cleveland Tram-rail Division, The Cleveland Crane and Engineering Company**, Wickliffe, Ohio.

Frank J. Weitekamp elected secretary, **Thor Power Tool Company**, Aurora, Illinois. **Jack R. DeBacher** elected vice president.

Dean Strand appointed abrasive engineer for the Fox Valley, Illinois area, **Bay State Abrasive Products Company**, Westboro, Massachusetts.

A. H. Lewis appointed manager of tool steel sales, **Crucible Steel Company of America**, Pittsburgh, Pa.

Harold F. Nunn elected vice president, **Henry Diss-ton and Sons, Ltd.**, Toronto, Canada.

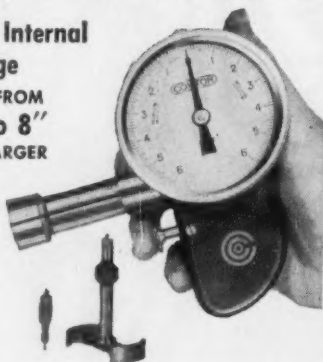
Did you know that - - -

Several of your home appliances probably were gaged with Comtorplug



Precision Internal Gage

SIZES FROM
 $\frac{1}{8}$ " to 8"
AND LARGER



COMTORPLUG with interchangeable expanding plugs to gage simple or special bores from $\frac{1}{8}$ " to 8" dia.

Unique Advantages

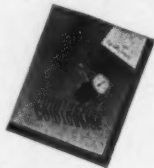
- Positive gaging accuracy to fraction of .0001" regardless of who operates it.
- Indicates actual size, a fixed—not passing—reading.
- Positive 2-point gaging—automatic centering.
- Shallow holes, deep holes, inside splines, open-end holes gaged easily.
- Detects ovality, back or front taper, bell mouth, barrel shape.
- Reaches to bottom of blind holes.
- Gages work while still held in chuck.
- A shop tool for all-day every day use.
- Portable—no wires, hoses or stands.

Investigate the gage used by the thousands in jet engine, automotive transmission, household appliance, farm machinery, guided missile and other volume-precision plants. IT MAKES PRECISION GAGING EASY . . . at machine . . . at inspection bench . . . for selective assembly. No other like it—investigate and see why.

COMTOR COMPANY

64 Farwell St.
WALTHAM 54,
MASS.

GET THE FACTS—
REQUEST BULLETIN 49



For more data circle 347 on Reader Service Card

When
one welder
gives both
AC and DC...

Handles
every type of
electrode...

Yet costs less
to buy
and operate...

WHY
shouldn't you be
using IDEALARCS
for your production
welding?

Certain electrodes
work best on...



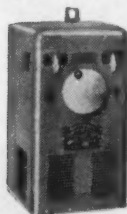
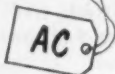
Other electrodes
operate better on...



Some rods that work best
on DC in smaller sizes...



work best on AC
on the larger sizes.



IDEALARC

with its instant selection of AC or
DC gives optimum performance
on every type and size electrode.

There's no other welder like IdealArc.

THE LINCOLN ELECTRIC COMPANY

Cleveland 17, Ohio

*The World's Largest Manufacturer
of Arc Welding Equipment*

© 1956 The Lincoln Electric Company

THE LINCOLN ELECTRIC COMPANY
Dept. 3508, Cleveland 17, Ohio

- ☐ Send me Bulletin 1343 on IdealArc.
☐ Have representative call.

Name _____
Position _____
Company _____
Address _____
City _____ State _____



For more data circle 348 on Reader Service Card

new shop equipment

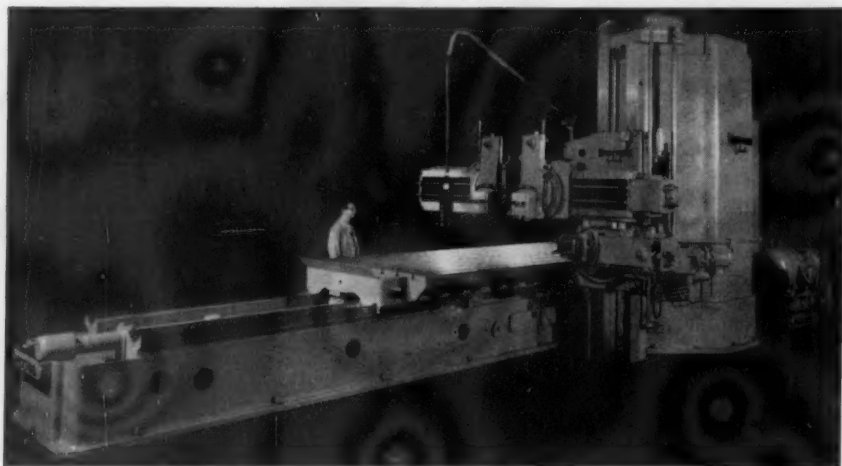
***Descriptions of new machines, tools
and materials for metalworking.***

IMPROVED PLANER DRIVE PERMITS CONTROL OF TABLE AND FEED MOVEMENTS FROM PENDANT

To complement the development of carbide tools, and in keeping with the trend toward centralized machine controls, Rockford Machine Tool Co., Dept. H, 2500 Kishwaukee St., Rockford, Ill., has developed the H-3 Drive with Elecdraulic Control for its heavy duty HyDraulic planer. This addi-

tional refinement on the H-3 drive is claimed to make it possible to actuate or control all table and feed movements of the machine from the planer pendant.

H-3 drive features three distinct ranges—three planer drives in one. A powerful, efficient drive at both high and low speeds, it is said to combine the ruggedness and efficiency of the single circuit planer with all the speed required for carbide planing. It has two hydraulic cylinders with different



Rockford Heavy-Duty Hy-Draulic Planer equipped with H-3 Drive with Elecdraulic Control

areas. Solenoid operated selector valves direct oil from the pump to either cylinder, or both in combination. Since the pump delivery can be applied to three distinct areas, three force ranges are available with three inversely proportional speed ranges.

The H-3 drive is a fully leaded reversing circuit, so that the deceleration and acceleration of the table and the work load is absorbed within the hydraulic system. Acceleration is controlled by the servo-operated reversing pump control. Reversals are smooth, shockless and accurate over the full range of cutting speeds available on the machine.

To further simplify the operation of the planer, speed range selection and cutting speed adjustment are available from the pendant. The simple, electrically operated servo pump control is controlled from the pendant. A direct reading tachometer dial is provided to indicate the exact cutting speed at which the table is traveling at all times. Return speed is independent and infinitely adjustable. Maximum return speed is available automatical-

ly at any desired cutting speed.

Cutting speed may be increased or decreased from the pendant by push button while the machine table is running. Stepless adjustment in all ranges, from 0 to maximum, is available. Range selection is by means of a selector switch on the pendant. Feed actuation, at either the start or the end of the normal cutting stroke, may also be selected by a switch on the pendant. Inch control of the table, in either cut or return, is possible from the pendant. A selector switch provides a predetermined fixed inch speed for setup, and, in normal operation, by depressing the table cut button, the cutting speed drops to inch during the time the button remains depressed.

For more data circle 71 on Reader Service Card

★ ★ ★

LATHE UTILIZES HIGH SPEED, TUNGSTEN CARBIDE AND CERAMIC TOOLS

The Maserati Corporation of America, Westbury, L. I., N. Y., has announced an engine lathe designed for

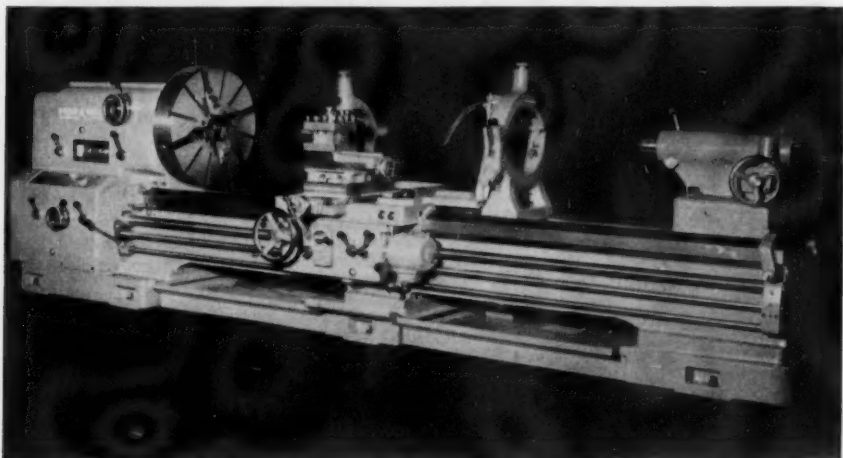


Illustration showing overall view of one model of Maserati-Morando Engine Lathe

new shop equipment . . .

use with high speed, tungsten carbide and ceramic tools. Designated as the Morando, the lathe is available in four models and eleven sizes ranging from 18-inch swing and 10 h.p. to 55-inch swing and 52 h.p. All models have 24 speeds in geometrical progression. Standard speeds range from 12 to 1,200

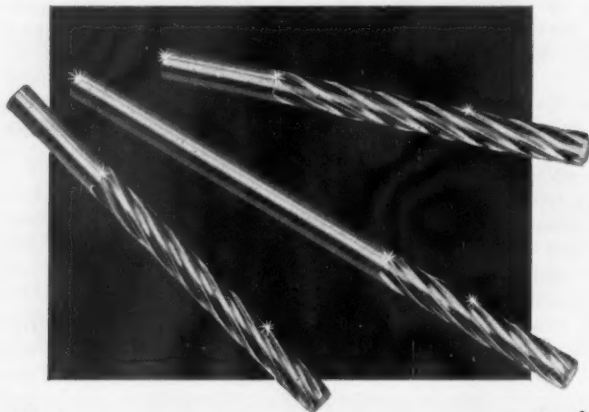
r.p.m. and 24 speeds in the high speed range from 15 to 1,500 r.p.m.

The spindle is mounted front and center on preloaded Timken bearings. A cylindrical roller bearing is mounted on the rear to allow for heat and friction expansion. Two Timken bearings surround the bull gear adjacent to the spindle nose to eliminate deflection.

Special U-ribs on the Morando's extra wide bed supply the strength characteristics of a box section and diagonal rib setup. The bed is also available, on request, with gap and corresponding removable bridge for large workpieces.

Hardened and ground Meehanite insert ways heat treated to 45-50 Rockwell "C" opposing hand scraped surfaces reduce friction wear by maintaining a positive film of lubricant. Extra long carriage slides and large bearing surfaces lend rigid support to the cutting tools. Taper gibs provide for correct fit.

Hardened, precision ground chrome-nickel alloy steel gears are used in the headstock. Spline shafts on anti-friction bearings afford a high degree of precision and stability to all rotating



Get smoother, more accurate holes
with "ground-from-the-solid"

ACE *Drill Length and Chucking* **REAMERS**

More holes faster . . . and at lower cost! That's what you get from Ace Drill Length and Chucking Reamers! They're made of pre-hardened H.S.S., produced by the Ace "ground-from-the-solid" process. This gives them their highly polished right-hand spiral flutes . . . plus keener, longer-lasting cutting edges. They're economical to use . . . particularly the drill length reamers which can be re-ground more times for longer useful life. Next time you need reamers, ask your distributor for "ACE".

A 56 PAGE, illustrated catalog (No. 52-F) containing complete information on the entire line of ACE Drills and hardened H.S.S. drill blanks is yours for the asking. Send for it today!

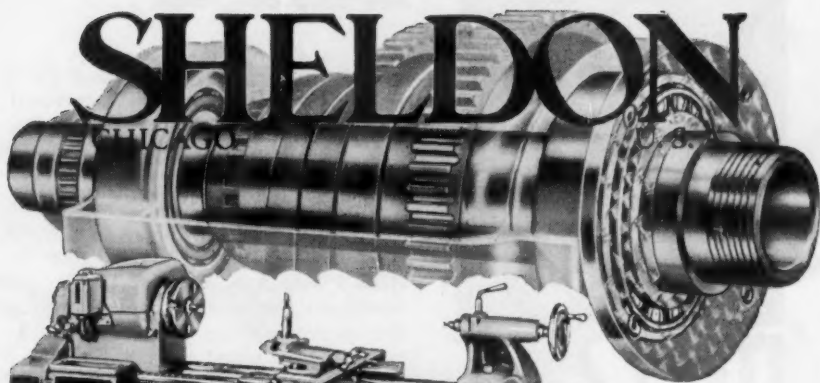


ACE DRILL

ADRIAN, MICHIGAN

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS

For more data circle 349 on Reader Service Card



Sheldon's larger, wider
"Zero Inspection",
Tapered Roller Spindle
Bearings save you
money by making
these lathes better in
6 ways.



Write for G-55
catalog showing
new 10" 11" and
13" swing, bench,
cabinet and
pedestal mounted
Sheldon
Precision lathes.

- 1st They meet Sheldon's high standard for accuracy—each bearing has a run out limited to .00015"
- 2nd They absorb thrust and radial loads beyond requirements—basic rating on front bearing at 500 R.P.M.
- 3rd They end costly bearing maintenance—require only a fractional turn of bearing take-up after long periods of service.
- 4th They hold the spindle in rigid alignment while permitting it to turn freely at high or low speeds—the line contact between rolls and races, and the opposing taper design, preclude lateral movement or end play.
- 5th They minimize friction—smooth mirror finished rollers and races running in light oil, deliver more horsepower at the Spindle Nose and lower power costs.
- 6th They increase work capacity. Larger than similar type bearings on other lathes in this price range, these bearings make it possible to turn out more work and better work at lower costs.

for radial loads.....3540 lbs.
thrust loads.....2335 lbs.

SHeldon MACHINE CO., INC.

4250 NORTH KNOX AVE. • CHICAGO 41, ILLINOIS

For more data circle 350 on Reader Service Card



Micro Spray LAY-OUT DYE (Purple)

MICCRO Lay-Out Dye, long the leader in its field, now available in an AEROSOL package for SPRAYING.

All the advantages—instant drying; clear, sharp lines—*plus* easy-to-use, dependable, efficient MICCRO Spray container.

Regular MICCRO Supreme Lay-Out and Identification Dye in seven distinctive colors available as always in brush-in-cap and conventional containers.

*Write for circular
on company letterhead*

**MICHIGAN CHROME
& CHEMICAL COMPANY**

8615 Grinnell Ave., Detroit 13, Mich.

For more data circle 351 on Reader Service Card

204 modern machine shop

new shop equipment . . .

shafts and further minimize friction wear. All gearboxes are totally enclosed.

For more data circle 72 on Reader Service Card

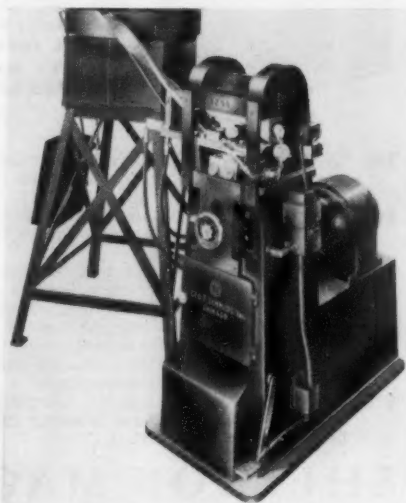
★ ★ ★

END CAP MARKING MACHINE

For the easy marking of motor end caps, Geo. T. Schmidt, Inc., 1806 W. Belle Plaine Ave., Chicago 13, Ill., has developed the marking unit shown in the accompanying illustration. The parts to be marked are dumped into a 36 inch diameter hopper, which is large enough for a 30 minute run. The marking rate with this equipment is 1,600 parts per hour.

The marking tool, which is mounted in the machine head, consists of a radial type and logotype holder to permit variations in marking. Several holders with type and logotype are used so that setups for subsequent runs can be made while the machine is in operation.

For more data circle 73 on Reader Service Card

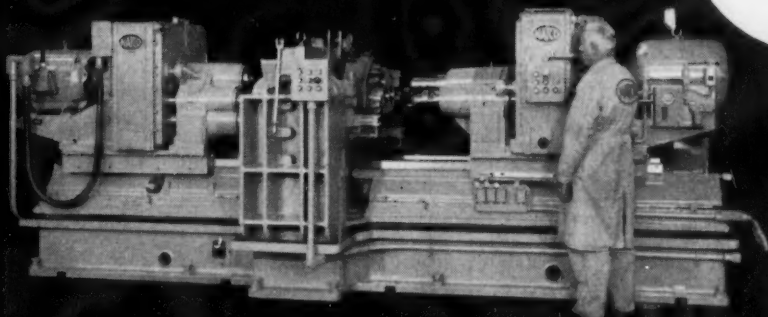
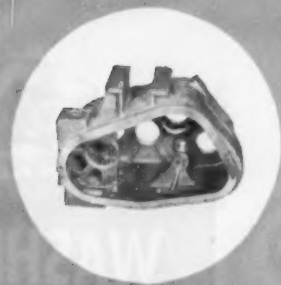


Schmidt Motor End Cap Marking Machine

July, 1956

Natco[®] Automatic Matches Boring Mill Accuracy

and quickly converts for five different jobs



This Natco two-way machine stepped in where automatics "fear to tread!" It replaced a precision boring mill, speeded production and didn't give up a tenth in accuracy! At The Frank G. Hough Co. boring mills were used for exacting tolerances on transmission parts for the Hough Payloader[®]. Higher production was desired.

Now with a Natco two-way automatic, Hough is getting production rates—not job shop rates. The Natco bores diameters to within .0005"—square with mounting face within .0005" per inch bore length. The machine also chamfers, counterbores and notches boss contours.

Versatile too! Hough processes five different transmission housings or covers with a single machine. After a typical production run averaging 100 parts, the machine is quickly converted to another job.

Ask for information about the PAYD (Pay-As-You-Depreciate) Finance Plan.

Call Natco offices in
Chicago, Detroit, Buffalo,
New York, Boston,
Philadelphia, Cleveland
and Los Angeles;
distributors in other cities.

National Automatic Tool Company, Inc.

Richmond, Indiana

Multiple-spindle drilling, boring, facing and tapping machines. Special machines for automatic production.





FAST DELIVERY . . .

from this medium-size Detroit stamping plant.

For value and service, Whitehead is your source. Any metal—any special material. Whitehead has dies on hand for O.D. sizes $\frac{1}{8}$ " to 18"; any I.D. you want; any thickness from .002" to $\frac{3}{8}$ ".

In stock: S.A.E. standard light, medium, and heavy steel washers; brass and copper, small and large patterns; bolt sizes.

Get this catalog for your files by writing Whitehead at Detroit.

55-4



**WHITEHEAD
STAMPING CO.**

**1673 W. LAFAYETTE BLVD.
DETROIT 16, MICHIGAN**

For more data circle 353 on Reader Service Card

206 modern machine shop

new shop equipment . . .

MACHINE DEBURRS AND CHAMFERS GEAR TEETH

A single station deburring and chamfering machine, designated as the Model BME-14 Duplex, that chamfers both sides of a gear simultaneously and is said to raise production ceilings possible with Burr-Master mechanical gear chamfering to a new high, has been introduced by Modern Industrial Engineering Co., 14230 Birwood Ave., Detroit 38, Michigan.

This efficient machine removes the sharp edges on the ends of gear teeth and, at the same time, removes the burrs resulting from the gear cutting process. Spur gears, helicals and straight sided, as well as involute form splines from $\frac{5}{8}$ to 6 $\frac{1}{2}$ -inch pitch diam-



**Burr-Master BME-14 Single-Station Duplex
Gear Deburring and Chamfering Machine**

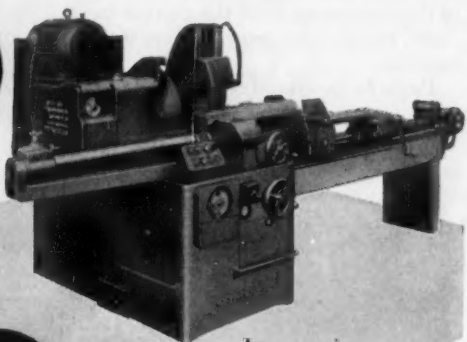
July, 1956

THE



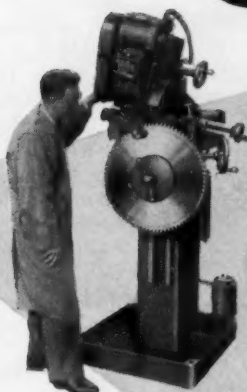
IS A Triple-threat TO HIGH CUTTING COSTS

CIRCULAR
SAWING
MACHINES



The No. 2-8 machine for cutting off solid metal up to 8' square.

SAW
BLADE
SHARPENERS



The G-45 sharpener for blades 8' through 48' diameter.

SAW
BLADES



M. & M. saw blades cut any machinable metal. Cut-off blades: segmental — 11" through 120" diameter; solid — 8" through 20" diameter. Slitting saws — 3" through 8" diameter.

You may profit immensely by applying the M. & M. Triple Threat to your cut-off costs. Machine, blade, and grinder, made by the first company to build all 3, often effect phenomenal savings, as proved by detailed case studies. Just such a study of your job is yours for the asking. We offer you an unmatched experience in the sawing of any machinable metal, round, square or structural shapes, from 1/4" through 43" diameter.

**THE
MOTCH & MERRYWEATHER
MACHINERY CO.**

MACHINERY MANUFACTURING DIVISION
CLEVELAND 13, OHIO

Builders also of Production Milling, Vertical Turning, Automatic and Special Machines

For more data circle 354 on Reader Service Card

new shop equipment . . .

eter, can all be handled on the Model BME-14 Duplex at a production rate up to five teeth per second per side. At the end of the automatic chamfering cycle, the electric clutch stops rotation of the workpiece with the cutters in the "out" position for easy loading and unloading.

Parts to be chamfered are placed on

the work spindle, taking central location from either the hole or shaft diameter and vertical location from the edge of the gear or spline. Radial location and indexing of workpiece is taken from the gear teeth proper. To chamfer the gear or spline, two dovetail form cutters are stroked simultaneously past the edges of the teeth; one at the bottom and the other at the top. Depth of chamfer is infinitely variable with the adjustment being quickly and easily

made in the tool-holders.

The Burr-Master Model BME-14 Gear Deburring and Chamfering Machine is equipped with upper and lower cam-actuated rocker tool assemblies, precision ball bearing intermittent indexing assembly, with provision for radial tooth location, and ball bearing mounted vee belt drive totally enclosed with necessary safety guards. The Model BME-14 Duplex is built to J.I.C. electrical standards. The motor is 1 h.p., 1,200 r.p.m., 220/440 volt a.c. Floor area required is 32x42 inches. Approximate weight of the machine is 1,800 pounds.

For more data circle 74 on Reader Service Card

NOW

FROM THIS CATALOG



NEW CARBIDE TOOLING PRECISION- MADE

Golden-Circle Rotary Tools

New! Elgin's expanded line of burs and rotary files, plus solid carbide end mills, all shapes and sizes precision-made. See how they can meet your requirements at lower cost! Write for your FREE copy of the new "Golden Circle" booklet today!

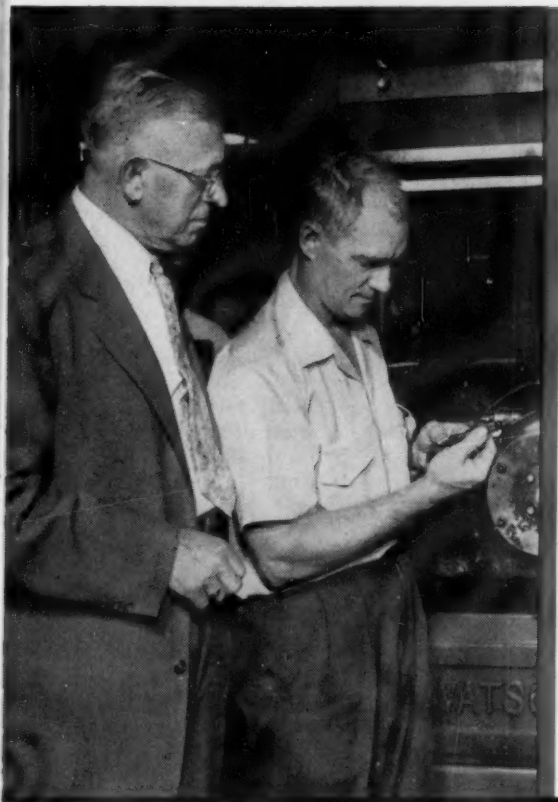
ABRASIVE DIVISION, DEPT. (P)

ELGIN NATIONAL WATCH COMPANY

Elgin, Illinois

For more data circle 355 on Reader Service Card

STANOIL Industrial Oil delivers on tough assignment at Indianapolis Screw Products Corp.



Mr. R. W. Williams, Plant Superintendent checks pitch diameter of thread with Glenn Riggs, Standard lubrication specialist. Glenn Riggs is an old hand at helping industrial firms work out lubrication problems. Glenn has been doing this sort of thing for 28 of the 30 years he's been with Standard. This background and experience, customers have found, pay off for them.

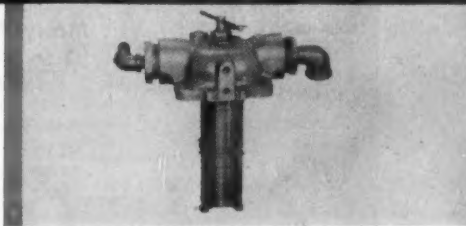


STANDARD OIL COMPANY (Indiana)

Rolling threads on aluminum bronze with pitch diameter tolerances as close as .0014" is a tough job but Indianapolis Screw Products Corporation is used to taking on such jobs and delivering. They give tough jobs to the hydraulic oil they use, too, and they expect it to deliver. They've given such a job to STANOIL and they're getting the results they expect—and more.

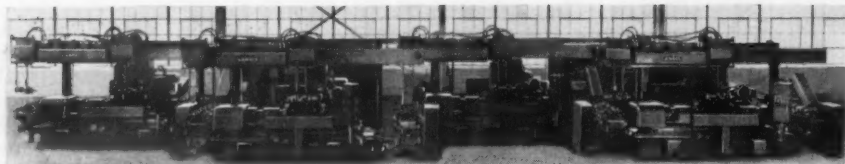
STANOIL Industrial Oil is used in the hydraulic system of a Watson-Flagg precision thread roller in the Indianapolis Screw Products Corporation plant. The hydraulic system filter has not been cleaned in over a year because it hasn't needed cleaning. Here, as in other applications, STANOIL delivers top performance with minimum maintenance and maximum system cleanliness.

PERHAPS you would like to know about the use of STANOIL in a hydraulic application in your plant. In the Midwest and Rocky Mountain states, a lubrication specialist at your nearby Standard Oil office will be happy to discuss it with you. Call him. Or contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.



Cuno filter in Watson-Flagg Thread Roll machine has been filtering STANOIL more than a year. Filter remains clean.

new shop equipment . . .



Integrated line of four Landis Type DH Automatic Hydraulic Crank Pin Grinding Machines complete with automatic loading and transfer equipment and automatic sizing.

AUTOMATIC GRINDING LINE FOR CRANKSHAFT PIN BEARINGS

As a result of an automatic grinding line announced by Landis Tool Co., Waynesboro, Pa., V-8 crankshaft pin bearings can now be ground automatically to precision limits without the necessity of manually loading machines and interrupting cycles to index the shaft for each pin. Production

is increased and quality is improved.

Automatic gaging is incorporated in this automation line. This includes gaging of the workpiece during the grinding cycle and also between stations. The production line consists of four standard Landis crankpin grinding machines which are synchronized electrically, hydraulically and mechanically. Loaders move the crankshafts from one machine to another.



Model LTX
Special Duty
1 ton — \$179.50
less motor



Model B-5
5 ton
\$199.50
less motor

Model B-2-A
2 ton half press
\$94.50

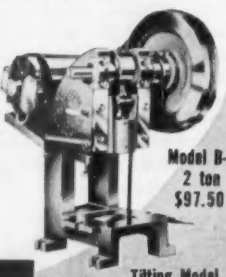


Heavy Duty Bench Type
ALLEN
PUNCH PRESSES
Powerful
Dependable and Economical
Fully Guaranteed

Many Popular Models
1 to 5 ton capacities
Moderate in price

See Your Supply Dealer
or write for **FREE** punch
press catalog giving com-
plete information, speci-
fications and prices on
our complete line of
bench type punch presses.

Model B-2
2 ton
\$97.50



Tilting Model
\$127.50
less motor

ALVA ALLEN INDUSTRIES
Dept. MM Clinton, Mo.

For more data circle 357 on Reader Service Card

Now... **Gorton Milling Machines** Feature Hydraulic 3-Dimensional Controls



"Pencil Pressure" **does the Work**

Gorton now offers you several models of Super-Speed Vertical Mills equipped with sensitive and accurate hydraulic controls featuring feeds up to 40 inches per minute.

AVAILABLE

3

WAYS

1. Vertical action only
2. Cross and longitudinal
3. Three-dimensional combination

Gorton Milling Machines with hydraulic Tracer Control must be ordered as such. Hydraulic equipment is not an attachment but a permanent installation.

For die or mold work (single or multiple units), production profiling and duplicating — short runs, experimental pieces or high production.

Gorton also offers manual and automatic Tracer-Controlled Milling Machines and Pantographs for 2- or 3-dimensional operation; 1 to 1 ratio, or reproduction at variable reductions, with single or multiple-spindle machines for work of any shape or size.

Shown above: Gorton 9-J Super-Speed Vertical Mill with Tracer hydraulic installation.

Write for Form 2697-AD5 and 1707 -1655 General Catalog.



GEORGE GORTON MACHINE CO.

1707 RACINE STREET

RACINE, WIS., U. S. A.

SINCE 1893

Tracer-Controlled Pantographs, Duplicators — standard and special... Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.



For more data circle 358 on Reader Service Card

A 8731-1PA

July, 1956

modern machine shop 211

new shop equipment . . .

The following description covers one example of various cycles and machine arrangements available: Crankshafts are brought to the line, at the left hand end, and deposited on a conveyor. The loader picks up a single crankshaft and moves it transversely to the grinding position of the first machine. The shaft

is lowered into two chucks. Loader fingers swing out to clear the crankshaft as they return to the upper position. A gaging finger moves into position to accurately and automatically locate the crankshaft longitudinally between the chucks. Hydraulic pressure clamps the crankshaft in both chucks.

The loader, which has a set of fingers at both the right and left hand ends, returns to its original position. One set of fingers is now over the conveyor and one set over the crankshaft.

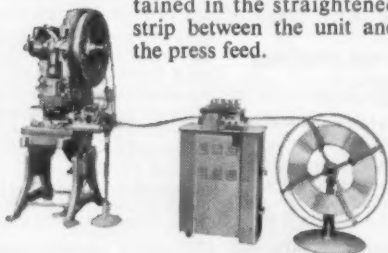
The grinding wheel moves rapidly into position to grind sidewalls and diameter of the first crankpin of the revolving crankshaft. The diameter is ground to a predetermined size within limits of 0.0005 inch. An in-process double contact air gauge, which is automatically positioned on the pin being ground, controls the grinding cycle through the feed and spark-out periods to final size. After size is reached, the grinding wheel is automatically withdrawn and the crankshaft stops revolving with the chuck clamps in the proper position to permit the shaft to be removed.

Economy • Dependability

WITTEK STOCK STRAIGHTENERS

Used in conjunction with a reel stand and automatic feed for punch presses, the Wittek Stock Straightener is a self-contained, motor-driven unit designed for maximum efficiency in the continuous straightening of coiled stock. Standard models handle stock with widths up to 12 inches. An infinitely variable speed drive permits any desired straightening speed so that the proper slack is maintained in the straightened strip between the unit and the press feed.

This typical Wittek automatic production feeding setup includes —Wittek roll feed mounted on the punch press, Wittek stock straightener, and Wittek self-centering reel stand.



Write for full particulars
WITTEK Manufacturing Co.
432½ W. 24th Place • Chicago 23, Illinois

Production
Feeding
Equipment

5577



For more data circle 359 on Reader Service Card

Abrasive Cutting

*the best way to cut many materials
the only way to cut some*

Campbell Cut-Off Machines

**WHAT KIND OF A CUT DOES
YOUR JOB REQUIRE?**

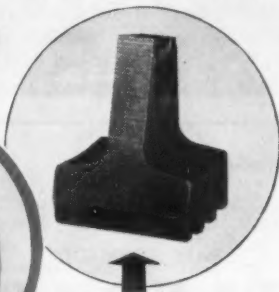
THIS

Clean, smooth edges
that require
no further finishing



or **THIS**

Rough, serrated edges
that must be machined
if smooth finish is required



• The smooth cut—made on a CAMPBELL Oscillating Wet Abrasive Cut-Off Machine and the just-right ALLISON Abrasive Wheel for the job—saves a grinding operation at a Midwest gear plant.

Another combination of CAMPBELL Cut-Off Machine and ALLISON Wheel cuts stainless steel tube twice as fast as by other methods for a large aircraft manufacturer.

Can you cut tough K Monel, 4¾" dia., in two minutes per cut by present methods? Whatever your problem, our abrasive cutting specialists can improve your cutting operation and save you money.

OSCILLATION makes these big cuts with speed and economy

• The cross section of gear teeth (shown left above) is cut smooth, fine-finished and ready for metallurgical study.

It results from the wet cut of an Oscillating CAMPBELL Abrasive Cut-Off Machine with abundant coolant applied just where it does the most good. The Oscillation of the ALLISON Abrasive Wheel, the right one for the job, handles big cuts like this with speed and economy.

If your cutting involves alloy or high carbon steel, this CAMPBELL-ALLISON combination just can't be beat.

ACCO



Let us send you this book

**Campbell Machine Division
AMERICAN CHAIN & CABLE**



931 Connecticut Avenue, Bridgeport 2, Connecticut

For more data circle 360 on Reader Service Card

new shop equipment . . .

The withdrawal of the grinding wheel signals the loaders to again handle the crankshafts. The shaft from the first machine is moved to a conveyor between the first and second grinders. Here, it is automatically inspected for diameter, width and taper.

If any of the dimensions do not pass

inspection, signal lights show which dimension is in variation from the limits. The preceeding grinding machine will stop cycling until the correction is made. A set of visual gauges show the inspection sizes so that the operator knows how much correction to apply.

This pickup, grind, pickup, inspect cycle continues through the four machines until the crankshaft is finished. All grinders and loaders are in continuous cycle so that four crankshafts are being handled at all times.

The conveyors, between the grinders, have provision to store a quantity of crankshafts. However, a particular machine loader will not operate unless there is a crankshaft ready for loading and a vacant space on the next conveyor to deposit a finished shaft.

In the event that it is necessary to shutdown one machine for changing wheels or regular maintenance, the other three machines will stay in operation. The crankshafts are by-passed around the machine that is shutdown. The operation missed on the shutdown machine can be done on a conventional hand-operated, stand-by machine.

Complete safety devices are built into the machine system to prevent any damage. Grinding wheels cannot move while loaders are in operation. Crank carrying fixtures cannot revolve until a shaft is in position, clamped and the loader arms are retracted.

For more data circle 75 on Reader Service Card



MARK OF QUALITY

STANDARD

TAPER PINS



● The high quality and accuracy of Standard Steel Specialty Taper Pins have won them wide acceptance. Milled from bar stock, straight to taper and to extremely close tolerances, these pins give 100% performance. The uniformity and accuracy of the pins saves valuable time at assembly, assuring you trouble free service.

Write for complete catalog giving information on taper pins. Woodruff keys, machine keys and machine racks.

STANDARD STEEL SPECIALTY CO.
BEAVER FALLS • PENNSYLVANIA
Plants: Beaver Falls, Pa.; Hammond, Ind.

For more data circle 361 on Reader Service Card

Rowbottom for Cams

Ask for Estimates

When you need cams, come to Rowbottom for prompt service at worthwhile savings.

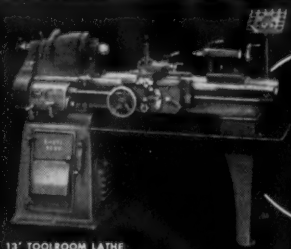
THE ROWBOTTOM MACHINE CO.
WATERBURY, CONNECTICUT

Also Cam Milling and Grinding Machines for producing cams of all types. Ask for details.



Send your specifications for quotations.

For more data circle 362 on Reader Service Card



13" TOOLROOM LATHE

SOUTH BEND 13" LATHES

**for accurate,
low-cost machining**



South Bend 13" Lathes are popular wherever precision parts are machined. Costs drop as their efficiency keeps production flowing even on the "head-ache" jobs. Operators prefer them for their simplicity and effortless handling. Set-ups and change-overs are made quickly and easily so that down-time is held to a minimum.

Find out how these quality built lathes can bring you better machining at lower costs. Your South Bend distributor will be glad to show you how they can help your machining problems. Or, mail coupon for catalog. Base price \$1533—**TIME PAYMENT TERMS:** Only 3¼% annual interest on original unpaid balance.

SPECIFICATIONS

Swing — 13½".

Distance between centers — 28¼", 40¼", 52¼".

Collet capacity — 1" max.

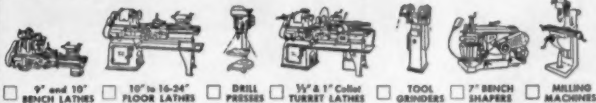
Spindle bore — 1½".

Spindle speeds—(8) or (16)—40 to 490 r.p.m. or 20 to 940 r.p.m. approximately.

Longitudinal, cross and thread cutting feeds — 48 each.



PLEASE SEND INFORMATION CHECKED:



☐ 9" and 10" BENCH LATHES ☐ 10" to 16-24" FLOOR LATHES ☐ DRILL PRESSES ☐ ½" & 1" Collet TURRET LATHES ☐ TOOL GRINDERS ☐ 7" BENCH SHAPERS ☐ MILLING MACHINES

Name _____ Street _____

City _____ State _____

Building Better Tools Since 1906 • **SOUTH BEND LATHE** • South Bend 22, Indiana

For more data circle 363 on Reader Service Card

new shop equipment . . .

AUTOMATIC ROTARY WIPING MACHINE

Two standard designs of wiping machines are available for parts, such as round dials or knobs, and for relatively flat small parts, all of which need to be surface wiped because the depressed characters to be paint filled are

first area coated using a block cut-out planar surface mask, which is necessary where the lines or lettering are too small for individual masking. The problem of painting these small characters is overcome by mask controlled spraying, which holds the paint to the immediate area. The production of these parts is said to be greatly increased over the old-fashioned method of hand wiping after spraying or dipping of the parts in process.

In the first instance, the round parts are placed on spindles on a rotary table machine; the spindles revolving under a taut cloth for the wiping operation. Frequently, the wiped parts can be automatically ejected into a chute. In the second instance, flat parts are wiped by a reciprocating movement under the wiping cloth ribbon, which automatically indexes sufficiently to present a clean area for each succeeding piece.

The machine consists of a variable speed table on which 24 revolving workholders are mounted. These workholders are so designed to facilitate ease of hand or automatic loading

PRECISION

Machine Tool Attachments

with endless versatile variations

TRAVERSE SLIDES FEEDS TABLES

SPINDLES—MOTORIZED OR BELT DRIVE

FOR WORK HEAD OR GRINDING WHEEL

DO IT YOURSELF!

Select a **STANDARD Precision Spindle** and/or **Work Head . . .**

•

Assemble with **STANDARD Feeds or Traverse . . .**

•


To convert your old machine tool . . .


•

To design your own assembly or machine tool . . .


•

To incorporate in a special machine you wish **STANDARD** to build for you







8"x21" Precision (Tilting) Table



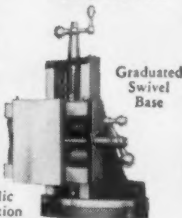
360° Swivel



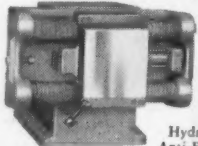
Compound Feed



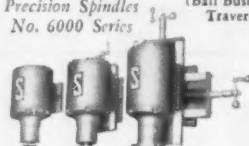
Special Mounting Base




Graduated Swivel Base



Hydraulic Anti-Friction (Ball Bushing) Traverse



Precision Spindles No. 6000 Series



Work Head or Grinding Spindles

Catalog on Request

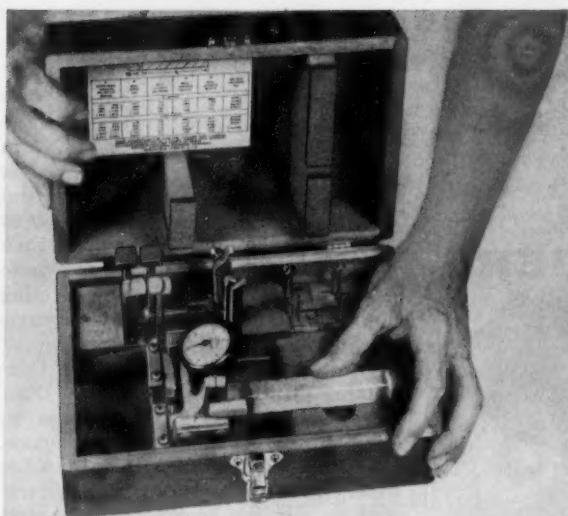
Standardize with

the **STANDARD** electrical tool co.

MACHINE TOOLS

2487 RIVER ROAD • CINCINNATI 4, OHIO

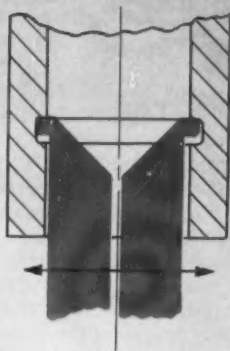
For more data circle 364 on Reader Service Card



Full line contact for long segment wear.



Straight line motion guarantees accurate measurement over full range.



BRYANT GROOVE GAGE

This Kit Checks Grooves for

O-Rings — .421 to 4.870 Diameter.

Snap Rings — .267 to 5.266 Diameter.

- Line contact assures long segment life
- No bearings or sliding members to wear
- Selected Northern hardwood case
- Immediate shipment from stock

Special segments available for checking non-standard grooves, concentricity of groove to bore, or depth of groove to face.

Groove segments can also be used on the Bryant B-21 Bench Gage.

WRITE FOR FULL INFORMATION ON BRYANT GAGES

Bryant Gage & Spindle Division

P. O. Box 620-D, SPRINGFIELD, VERMONT

Division of Bryant Chucking Grinder Company

For more data circle 365 on Reader Service Card

**HIGHER SPEEDS!
FASTER GRINDING!**

kipp

AIR GRINDERS

MODEL JA
50,000 R.P.M.

\$42⁰⁰
IN U.S.A.



Weight 12 ounces;
length 6 $\frac{1}{4}$ inches;
chuck size $\frac{1}{4}$ inch.
Wheel guard removed
for better illustration.

The RPM's stay up while grinding . . . not only when the grinder runs idle. That means better work—longer wheel life.

High speed grinding with small wheels was a Madison-Kipp development of the late twenties. It was born out of a pressing need in our tool room. Because tool room grinding problems are universal, we believe it will pay you to utilize Kipp grinders in your tool room as generally as we do in our own.

kipp

MADISON-KIPP CORP.

208 Waubesa St., Madison 10, Wis., U. S. A.
For more data circle 366 on Reader Service Card

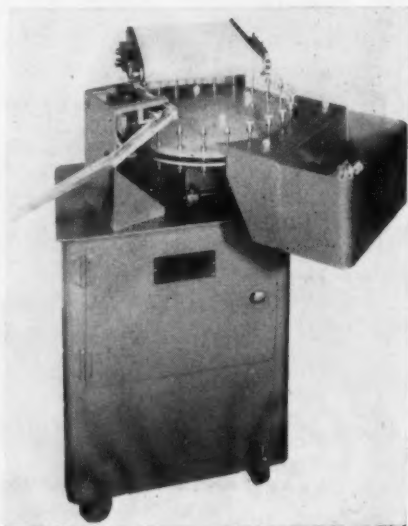
218 modern machine shop

new shop equipment . . .

of parts. The variable speed on the table permits production rates from 700 to 3,600 wiped parts per hour. The operator can sit at the machine and feed parts from the hopper supplied at the loading station. The parts then move into the wiping station where they are revolved under the wiping cloth until clean. Frequently, the parts can be automatically unloaded.

The machine, introduced by Conforming Matrix Corp., Toledo Factory Bldg., Toledo 2, Ohio, takes up less than five square feet of floor space, being only 30 inches long, 26 inches wide, and 43 inches high. It is powered by a $\frac{1}{4}$ h.p. explosion proof electrical motor and comes with a switch with overload protection. This compact unit is mounted on casters making it readily portable.

For more data circle 76 on Reader Service Card



Conforming Matrix Automatic Wiping Machine

July, 1956

CARB-O-PLATING

*brings you CARBIDE WEAR LIFE
at Substantially Lower Cost*

By the application of a thin wear-resistant coating of tungsten carbide—by means of the Linde Process—the life of gages, parts and tools is extended many times over.

Carb-O-Plating as employed by Lincoln Park offers you definite advantages. It provides the wear life of carbide at a cost considerably lower than when solid material is used. And because it is applied over a steel base, the products have resistance to mechanical shock and are not subject to breakage as can occur with sintered carbide. The process also makes possible the highest degree of accuracy in finished products.

In addition to these features, Lincoln Park offers the extra advantage of extremely fine finishes—characteristic of all the company's precision products. Full information on Carb-O-Plating is yours for the asking. Write today.



THE PLUS IN PRECISION

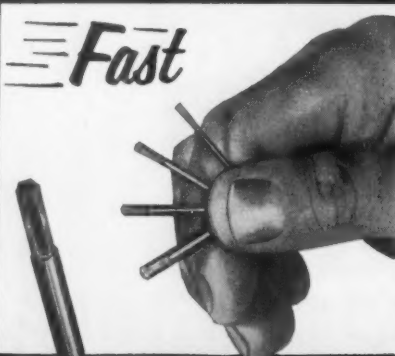
Lincoln Park

INDUSTRIES, INC.

1719 FERRIS AVENUE • LINCOLN PARK 25, MICHIGAN

For more data circle 367 on Reader Service Card

Fast



**Production
OF SMALL
HEX
SOCKETS**

These new strike broaches by W & S small tool specialists are for quantity production of sharp, clean hex sockets in set or cap screws. Made of specially heat-treated, high speed steel, they are ground to a tolerance of 0.0005" across the flats. For set screw sizes #0 to 1/4".

If you use small tools, and you are not familiar with W & S tools and tool design service, write to:



WOODRUFF & STOKES CO.
INCORPORATED

Bldg. 32, 355 Lincoln St.,
Hingham, Massachusetts

For more data circle 368 on Reader Service Card

220 modern machine shop

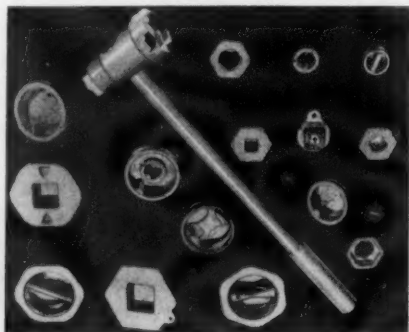
new shop equipment . . .

WRENCH PREVENTS DANGEROUS SPARKS WHEN DRUMS ARE OPENED

The Sound Drum Wrench, manufactured by Puget Sound Tools, 515 Second Ave., W., Seattle 99, Wash., is designed to open every size and shape of drum cap in a few seconds and to eliminate the spark hazard, always present when loose-fitting wrenches or hammer and chisel are used around gasoline or other dangerous liquids. Protection against sparking is provided by heavy cadmium plating of the entire tool and by close tolerance in the grips, which fit all the 15 or more drum caps and vent plugs in common use. Snug fit, good leverage and a non-slip knurled handle mean that no time is lost removing stubborn caps or plugs, and that cracked knuckles are no longer necessary in this type of work.

The Sound Drum Wrench is made of heat treated tool steel for strength and durability. It weighs only 2 1/4 lb., and is well balanced for fast, convenient use. The machined head includes both insert and socket type grips.

For more data circle 77 on Reader Service Card



Sound Drum Wrench, Insert and Socket Grips

July, 1956

FOR STRENGTH...



and precision performance

In servicing and in reassembling, screw thread fastenings are superior. In outstanding tap performance, it's BAY STATE that is superior.

BAY STATE TAPS



BAY STATE TAP & DIE COMPANY
MANSFIELD, MASSACHUSETTS

On the nearby shelves of your Industrial Supply Distributor



For more data circle 369 on Reader Service Card

July, 1956

modern machine shop 221

new shop equipment . . .

COMBINATION MASTER CONTROL

"Trippit" is the designation of a combination master control for all power presses, shears and brakes, which has been placed on the market by Product Design Engineers, 65 South Broadway, Yonkers, N. Y. The Trippit, as a complete ready-to-operate device, consists of a control box, two safety hand trips, electric foot trip, clutch actuator, limit switch, keys, die switches, a socket for 12 volt counter and a socket for 110 volt counter.

In use, the Trippit provides for automatic tripping by piece part, automatic gaging, counting, and shut-off after preset count. The automatic tripping and gaging features are said to completely eliminate operator error,

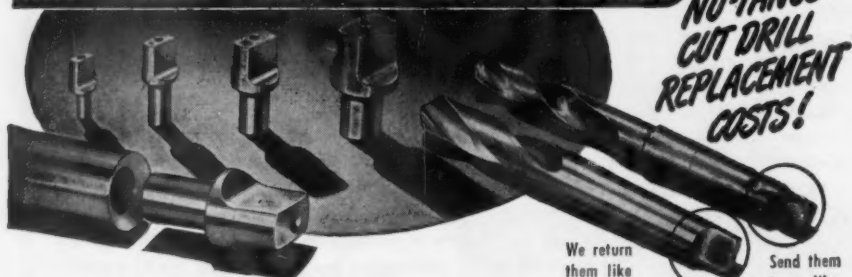


View of "Trippit" Combination Master Control

and reduce nesting and tripping time. Protection of dies is provided, since parts must nest perfectly or the press will not trip. Protection of all operations in automatic setups is provided because the press will be stopped at the end of the coil or in the event that material jams.

For more data circle 78 on Reader Service Card

NEW DRILLS FROM OLD WITH NU-TANGS



Send us your old drills—we'll make them new again at a fraction of the cost of a new drill! Exclusive NU-TANG* process replaces twisted or broken tangs with brand new tangs of correct size—and with **GUARANTEED ORIGINAL STRENGTH**. No welding—No distortion—No shortening of drills—No sleeves.

We return them like this!

Send them to us like this!

Any drill, reamer, or other tool with a Morse taper in sizes 2 to 6 can be repaired perfectly this quick new way. Delivery—One week. Used by many leading industrial plants. Amazingly low cost—satisfaction guaranteed. Send for complete information.

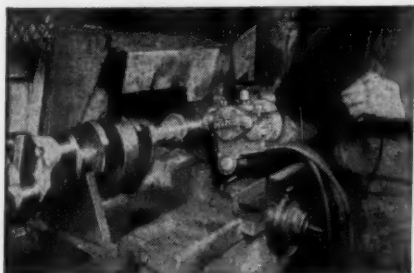
* Patent No. 2,512,033

NU-TANGS INC. 1335 Bates Street
Cincinnati 25, Ohio

For more data circle 370 on Reader Service Card



when mistakes happen...



Automotive crankshaft being brought up to inspection standards with metallizing. This automotive manufacturer formerly used plating for this type of salvage, worked one per hour. With metallizing, the salvage operation requires only 5 to 10 minutes per shaft, including surface preparation.



Free Bulletin

Get the full story on metallizing in production salvage. Bulletin 57-C describes and illustrates the procedures, provides data on typical parts, with interesting photo-micrographs showing the unique bonding action of Sprabond Wire. Send for a copy.



Metallizing Engineering Co., Inc.

1111 Prospect Ave., Westbury, L. I., New York • cable: METCO

In Great Britain:

METALLIZING EQUIPMENT COMPANY, LTD.—Chobham near Woking, England

...and they do in any busy machine shop, there's no need to scrap a mis-machined or otherwise damaged machine part that represents an investment of many expensive man-hours.

Parts like these are brought up to inspection standards quickly, easily and inexpensively with metallizing.

And with the new molybdenum metallizing wire, Sprabond, the only surface preparation required is cleaning. The molybdenum forms a molecular bond with the surface being rebuilt. Little heat is generated, eliminating any danger of warpage.

What's more—users have found that the extreme hardness of the molybdenum coating, and its microscopic porosity which provides superior lubricating characteristics, improve its "wear-ability" over ordinary bearing surfaces as much as 25 times. You haven't just salvaged a part—you've improved it.

The trade name, SPRABOND WIRE, is the property of Metallizing Engineering Co., Inc.

DON A. WATSON

METALLIZING ENGINEERING CO., INC.

1111 Prospect Ave., Westbury, Long Island, N. Y.

☐ Please send me Bulletin 57-C.

☐ Please have Metco Field Engineer call.

Name _____

Company _____

Street _____

City _____

Zone _____

State _____

For more data circle 371 on Reader Service Card

new shop equipment . . .

GAGE MAKES THREE SIMULTANEOUS CHECKS

The new combination squareness of face and concentricity gage, manufactured by the Bryant Gage and Spindle



Illustration showing Bryant Gage In Use

"SEALFLEX" TUBING



**Leakproof—
Stays in place
For Coolants, Cutting
Oils, Solvents**

Made of steel with brass fittings — moles, nozzles, stopcocks, etc., made in $\frac{1}{8}$ " $\frac{1}{4}$ " $\frac{3}{8}$ " $\frac{1}{2}$ " $\frac{3}{4}$ " I.D. Write for bulletin and prices.

VERMONT FLEXIBLE TUBING CO.

Lyndonville, Vermont

For more data circle 372 on Reader Service Card

HAND TAPPING with MACHINE PRECISION

Adapts for
LATHE USE

59⁵⁰

**F. O. B.
FACTORY**



Just slip a tap adaptor into the Dahlstrom Tap Guide and twist. Your hand tapping will be quick and accurate. For machine tapping, the spindle top is center-bored to fit the tail stock center of a lathe. Size 18" x 8" x 14". Included 9 adaptors (8-32 to $\frac{3}{4}$ "). Taps not furnished. Write for pamphlet on Tap Guides, Chucks and Autostops.

BRANCH MFG. CO., 15 Olson Drive, North Branch, Minn.

Dahlstrom TAP GUIDE

For more data circle 373 on Reader Service Card

224 modern machine shop

Division, Box 620, Springfield, Vt., is shown in use checking aircraft cylinder hold down bolts. Three simultaneous checks are made. These are checking size of 7/16-20 NF-3 threads; checking concentricity of 0.435 to 0.434 inch diameter in relation to thread; and checking under face squareness of bolt head bearing surface in relation to thread. A ball slide follower attachment used with the gage compensates for thread progression as the work part is turned.

For more data circle 79 on Reader Service Card

GRIND THE Eastern Centerless Way

Our new plant with
increased facilities

assures

PROMPT SERVICE

Eastern Centerless Grinding Co.

470 Tolland Street East Hartford 8, Conn.

For more data circle 374 on Reader Service Card

July, 1956

For sustained precision...

use **CIRCLE R**
Combination Center Drills
and Center Reamers

Your automatic system may be superbly designed, but its performance is governed by the cutting tools that do the actual production job. Circle R tools ensure longer runs, less down time, consistent precision—though they cost no more. Specify Circle R center reamers and combination center drills from a choice including regular and arbor or bell type, old standard letter drills, new standard number drills and spiral flute drills.

**We advise on special
requirements for automation**

Consult CIRCLE R Specialists in —

Burbank
Chicago
Cleveland
Dayton
Detroit

Hackensack
Indianapolis
Kansas City
Milwaukee

New York City
Philadelphia
Montreal
Phoenix

Pittsburgh
Providence
Rochester
St. Louis
Westbury, L. I.



CIRCULAR TOOL CO. INC.

PROVIDENCE 5, RHODE ISLAND

Specialists in Circular Cutting Tools Since 1923



METAL SLITTING SAWS
COPPER SLITTING SAWS
SCREW SLOTTING SAWS
COMMUTATOR SLOTTING SAWS
JEWELERS' SLOTTING SAWS
CUT OFF SAWS • CIRCULAR
KNIVES & ROTARY SHEAR
BLADES • CIRCOLOY STEEL
SAWS • SOLID & TIPPED
TUNGSTEN CARBIDE SAWS
COMBINED DRILLS & COUNT-
ERSINKS • CENTER REAMERS

For more data circle 375 on Reader Service Card

new shop equipment . . .

DRILL PRESS COMBINES PORTABILITY WITH ACCURACY

The "Portomag" electro-magnetic drill press, said to be a highly versatile machine tool which embodies easy portability with drill press accuracy, has been introduced by Portomag,



Portomag Electro-Magnetic Drill Press in use

The "UTILITY"



MARKING OUTFIT

Nine sizes of type stamped with the same holder—furnished in sturdy wooden box—for all interchangeable marking.

Write for "UT" Circular



M.E. CUNNINGHAM CO.

1051 CHATEAU STREET, PITTSBURGH 33, PA.

For more data circle 376 on Reader Service Card

Inc., 1511 E. Nine Mile Rd., Ferndale 20, Mich. Its heavy duty electro-magnetic base makes it possible to affix the power drill right to the surface of a job. For maximum operating accuracy, regardless of working position, the burden of drill weight is completely spared the operator.

Special features of this power tool include a 3-way power control switch, enabling the operator to vary the holding power in the electro-magnetic base. The switch allows for a reduction in power sufficient to hold weight of unit against working surface, yet allowing for movement for positioning to cen-

LEAK PROOF AIR GUN

*Precision made of Bar Brass
and Stainless Steel*



No packing gland—no external levers or buttons. Easy to use. Unequalled for long service, dependability and low maintenance. Order sample on approval.

AIR-WAY PUMP & EQUIP. CO. 1046 N. Kilbourn
Chicago 51, Illinois

For more data circle 377 on Reader Service Card

SANFORD BENCH SURFACE GRINDER MODEL 'SG'

for Wet* or Dry Grinding!

PRECISION • SPEED • SENSITIVITY

A low cost, precision machine for surface grinding dies, instrument parts, gauges and other small parts which would fit in the palm of the hand.

By using Sanford Bench Grinders many manufacturers of precision machinery have drastically cut over-all costs for finishing small intricate parts. This releases large, more expensive machines for heavier duty work.

The Sanford SG is the only low cost Bench Surface Grinder that

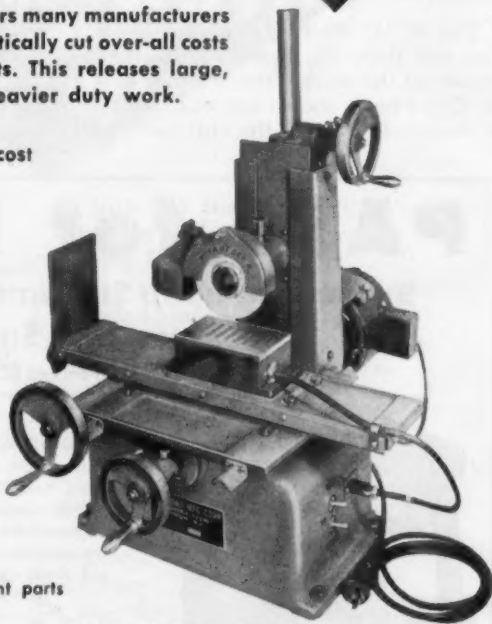
- Grinds to less than .0001" tolerances
- Operates without vibration
- Assures long life because Meehanite castings are used in its construction

SPECIFICATIONS—4" traverse
—8" longitudinal—6" vertical
under 4" wheel. Approximate
weight 160 lbs.

Complete details are included
in illustrated bulletin.

Send for your copy today.

Reconditioning facilities, replacement parts
and special attachments are available.
Send for price list.



*With optional equipment

SANFORD MANUFACTURING CORP.
1022 Commerce Ave., Union, N. J.

For more data circle 378 on Reader Service Card

new shop equipment . . .

ter punch mark. Full power position is said to hold the unit securely for accurate drilling work. A heavy duty power capacity (1,400 to 1,900 lb.) for positive positioning, demagnetizing switch for immediate removal from work, and an optional reversing switch for tapping operations are other features of the drill press.

For more data circle 80 on Reader Service Card

★ ★ ★

CLIP PUNCH FOR FASTENING SHEET METAL SEAMS

The W. A. Whitney Manufacturing Co., 636 Race St., Rockford, Ill., has placed on the market the Whitney No. 8C Clip Punch, shown herewith, which is designed to form the clip used to

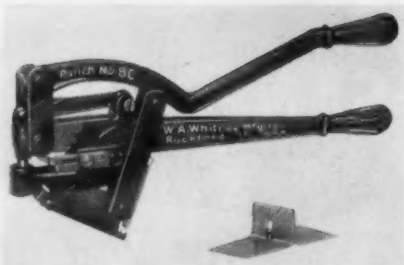


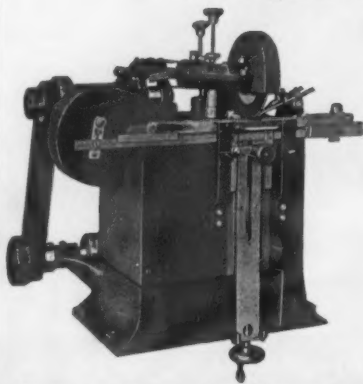
Illustration of Whitney No. 8C Clip Punch

fasten sheet metal seams for duct work in air conditioning, heating and ventilating jobs. Work performed with the tool requires no second operation or "hammering down," only one operation is necessary to complete the job.

The tool weighs 8 lb. and has an overall length of 18½ inches. The punch is said to have a capacity for three thicknesses of No. 20 gauge steel. For more data circle 81 on Reader Service Card

PAYS for ITSELF

**By Getting up to Six Times More Service
from your Hack Saw Blades**



Wardwell EC Combination Grinder will save you many dollars every year by increasing hack saw life as much as six times.

Wardwell Model EC Combination Grinder is the only single unit grinder adaptable for hack, band and circular saws that does not depend on the shape of the grinding wheel to form the shape of the tooth. This unique feature enables the operator to grind a variety of blades without dressing or changing wheels.

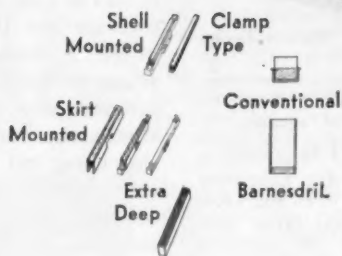
 **WARDWELL**
MANUFACTURING CO.
3803 Ridge Rd., CLEVELAND 9, O.

Maker of largest line of saw and tool sharpening machines

For more data circle 379 on Reader Service Card



only with **BARNESDRIL**
HONING TOOLS
AND
ABRASIVES



do you get these FEATURES!
Maximum Body Support at Cutting Edge

—freer cutting action and less spalling
Extended Stone Life

—Plas-T-Clad stones are "extra-deep", provide more useable stone with positive support to the cutting edge.

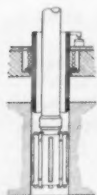
Automatic Compensation for Stone Wear

—Electronic Feed automatically adjusts pressure of stone against work to compensate for stone wear.

Plugmatic Sizing for Bore-to-Bore Accuracy

—sizes bore directly, is self-aligning, and not affected by stone wear.

Plugmatic Sizing



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For more data circle 380 on Reader Service Card

new shop equipment . . .

OSCILLATING DRY- ABRASIVE CUTTER

A high-speed dry-abrasive cutting machine, designated as the Model 28 Sever-All, is said to be of heavier construction than previous models and have a capacity to handle solid steels up to 4 inches square, 6 inch angles

and 8 inch channels at 90 degrees to axis. These specifications are based upon using an 18 inch diameter Allison abrasive cutting wheel, a 10 h.p. motor and a spindle speed of 2,450 r.p.m., according to its manufacturer, the Campbell Machine Division, American Chain & Cable Co., Inc., Bridgeport 2, Conn. The device is available in both stationary and portable models for cutting sheets, angles, channels, pipes, bar stock, tubes and solids of practically all analyses.

The Sever-All is an oscillating type unit in which the wheel and work are fed manually. With oscillation, the amount of abrasive wheel contact is reduced and cutting is performed with a minimum of pressure on the wheel. A double-acting workholder automatically positions the material being cut in the center of the support, and is clamped at both sides by a hand-operated crank handle. The machine's pedestal is of welded steel construction and its top is of solid steel plate, reinforced under the swing arm bracket. Front and sides of the unit are enclosed by



GREEN

Model D-2

Pantograph Engraver

Unique design of the two-dimensional Model D-2 features—Single micrometer adjustment controls vertical depth of cut, and adjusts height of copy table and pantograph.

Range of ratios from 2 to 1 to infinity!

Accessibility on three sides permitting panels up to 30" diameter to be engraved, milled or profiled. Vertical range over 10" allowing operations on complete chassis, cabinets or other bulky objects.

Ruggedness, stability and precise accuracy inherent in construction.

Mounted on the ruggedly constructed heavy duty steel Green Engraver Bench. All functional parts are conveniently within reach of the operator while seated. Accessibility of master type sets stored in lower cabinet trays, tools and accessories contribute to productive capacity.

A brochure with full details is yours upon request.

Literature also available on the smaller Model 106 three-dimensional engraver.

GREEN INSTRUMENT COMPANY

373 Putnam Ave., Cambridge, Mass.

For more data circle 381 on Reader Service Card

THESE NEW

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BEARINGS MAY SOLVE

YOUR COST PROBLEM



A more complete, advantageous bearing service than has heretofore existed came into being when Bunting added self-lubricating sintered powdered Bronze Bearings to the long established line of Bunting Cast Bronze Bearings and Bars. These new Bunting sintered bronze plain, flange and thrust bearings and bars are made to Bunting's traditional high standards of quality and precision. They embody knowledge gained in long and varied experience in manufacturing Bronze Bearings for all applications in the mechanical industry. They fully meet modern requirements.

Bunting Sintered Bronze products will be manufactured and distributed in the same responsible manner that has established Bunting leadership in the field of Cast Bronze Bearings. Use them with confidence.



BOTH Bunting Cast Bronze and Bunting oil filled, self-lubricating sintered powdered Bronze Bearings and Bars are available to you through your nearest Bunting Distributor. He has in stock all sizes for your immediate needs. Ask him or write for complete lists and dimensional data on Bunting Cast Bronze and Bunting Sintered Bronze Bearings.

Bunting®

**BUSHINGS, BEARINGS, BARS AND SPECIAL PARTS
OF CAST BRONZE AND POWDERED METAL**

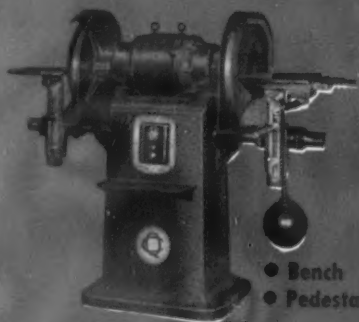
The Bunting Brass and Bronze Company • Toledo 1, Ohio • Branches in Principal Cities • Distributors Everywhere

For more data circle 382 on Reader Service Card



QUALITY AT LOW COST

QUEEN CITY HEAVY DUTY GRINDERS DISC GRINDERS AND BUFFERS



- Bench
- Pedestal

QUEEN CITY Heavy Duty Disc Grinders and Buffers save you money when you buy and during every hour of use. Ruggedly designed, they feature special heavy duty bearings and motors. So good they're offered on a 30-day trial, yet priced 20 to 30% under competing makes.

Choose from the complete range of QUEEN CITY Grinders and Buffers . . . floor and bench types . . . in sizes from $\frac{1}{2}$ to 10 H.P.

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MACHINE TOOL CO.**

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MACHINE TOOL CO.**

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"High Quality—Low Cost—For Over 50 Years"

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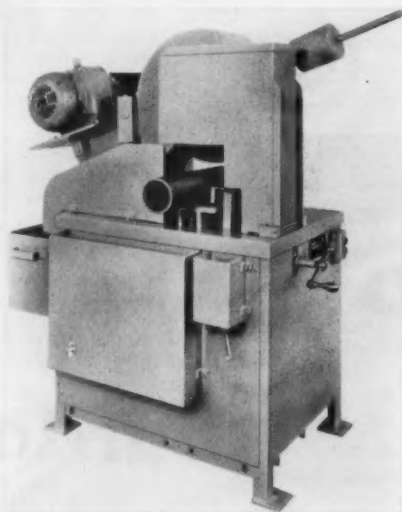
232 modern machine shop

new shop equipment . . .

removable steel plates to protect machine parts against dirt and accidental damage. Its spindle, of forged alloy steel, is heat-treated, precision ground and dynamically balanced. Each end of the spindle housing has labyrinth sealed type caps to prevent entrance of dirt and retain lubricant. Abrasive wheel guards of steel are designed for maximum operator safety by totally enclosing the cutting wheel during the cutting operation, except for openings on the sides of the guard to clear the work.

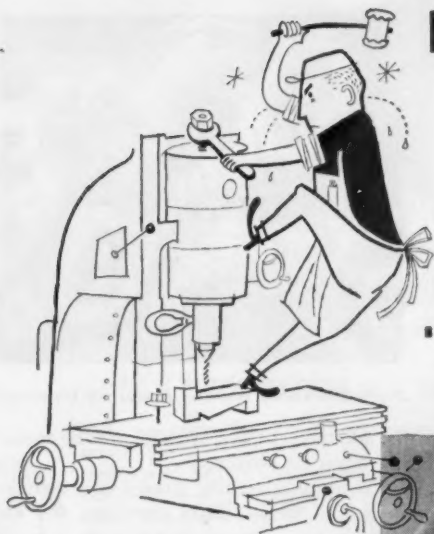
The Sever-All measures 56 inches front to back, 32 inches left to right, and 62 inches high. Its net weight, without electrical equipment or accessories, is 1,200 lb. The approximate weight of the machine with electrical equipment is 1,400 lb.

For more data circle 82 on Reader Service Card



Sever-All Dry Abrasive Cutting Machine

July, 1956

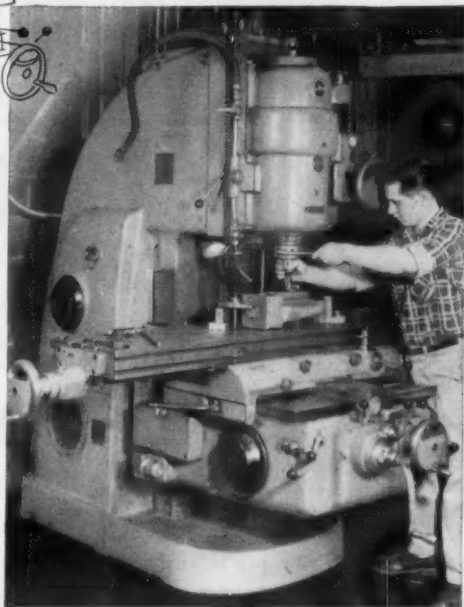


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The modern P.D.Q. tooling method completely eliminates the time lost in changing old fashioned type tools. No more "sweating out" loosening and tightening the draw bolt. A 60° turn of the lock nut and you're ready for another tool. P.D.Q. tool changes are only a matter of seconds... and tools are available in very small, small, medium and large series depending on the application. Write for literature covering all the advantages of modern, cost cutting P.D.Q. (Portage Double Quick) tooling.



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PORTAGE Double-Quick TOOL CO.

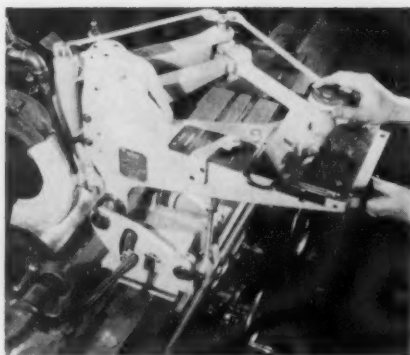
1041 SWEITZER AVENUE • AKRON 11, OHIO

For more data circle 384 on Reader Service Card

new shop equipment . . .

ATTACHMENT SPEEDS FORM TRUING ON CYLINDRICAL GRINDERS

Pratt & Whitney Co., Inc., 25 Charter Oak Blvd., W. Hartford 1, Conn., has announced a form truing attachment designed particularly for use on universal internal and external cylindrical grinders. Known as the Diaform Model No. 10 Universal, the attachment supplements the present line of surface grinder type Diaforms. Like all Diaform models, the Model No. 10 makes it possible to form-true complex contours on grinding wheels accurate to tenths in a matter of minutes. Equal-



Pratt & Whitney Diaform Model 10 Universal

ly accurate repeat truing can be made as often as required.

Mounted on the grinding machine table by an auxiliary carriage, the at-

You Can Rely on a **ROUSSELLE**



THESE 40-TON PRESSES

take job after job in stride and give you top speed and uniform output on a variety of work. They stress simplicity in every detail to achieve quicker set-ups, easier changeovers and simpler operation. All are extra rugged, high precision units, made to withstand hard usage and assure long, satisfactory service. They are **very moderately priced.**

Manufacturers of Rousselle Presses

SERVICE MACHINE CO. 2310 West 78th Street • Chicago 20, Ill.

Significant savings may result if you let our engineering staff assist you. There is no obligation.

Rousselle Presses are sold exclusively through leading machinery dealers.

Choice of 25 models in 5 to 40-ton sizes.

For more data circle 385 on Reader Service Card

in MILL HEADS

RUSNOK

*Builds the BEST Quality
at the BEST Price*

1/4 H.P. CONVERTICAL MILL HEAD

Only low cost mill head with quill travel attachment.

High speed medium-light operation.

For bench, floor and pedestal mills.

Fits milling machines with overarm 1 1/2" to 3".

3/8" end mill capacity.

\$245.00



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1/2 H. P. MILL HEAD

HEAVY DUTY MILLING ATTACHMENT

Fits milling machines with 3" to 5" overarm.

3/4" end mill capacity.

For vertical, horizontal and angular operations.

1 H. P. MILL HEAD

HEAVY DUTY MILLING ATTACHMENT

Fits milling machines with 3" to 5" overarm.

3/4" end mill capacity.

For vertical, horizontal and angular operations.

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DEALERS IN ALL PRINCIPAL CITIES

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For more data circle 386 on Reader Service Card

July, 1956

modern machine shop 235

4 Reasons why you should use

GAMMONS DIE REAMERS



Specially treated for today's modern die steels.



Rapid cutting capacity.



Tapers per inch .005, —.008, —.013 in stock.



Large range of standard sizes in stock at all times for your convenience.

WRITE FOR
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MANCHESTER 7, CONN.
Manufacturers of helical taper pins, chucking,
die makers and special reamers.

For more data circle 387 on Reader Service Card

new shop equipment . . .

tachment is well out of the way during grinding operations, but is quickly available for re-truing without disturbing the workpiece. The auxiliary carriage provides vertical adjustment for centering the truing diamond to the grinding wheel to suit different makes of machines.

In operation, a tracer is lightly traversed over the profile of an enlarged template of the desired form. Path of the tracer is transmitted at a 5:1 reduction ratio, which reduces any template error by the same ratio, to a truing diamond that accurately reproduces the form in the grinding wheel. Since a sharp diamond is used, the wheel is dressed as it is form-trued. Maximum diameter of grinding wheel that can be formed is 14 inches; maximum width of form produced on the wheel is 2 inches; maximum depth of form is 1 inch.

For more data circle 83 on Reader Service Card

★ ★ ★

NEW SERIES OF CEMENTED CARBIDE BLANKS

Firth-Loach Metals, Inc., Buttermilk Hollow Rd., McKeesport, Pa., has announced the addition of a new series of Firlomet cemented carbide blanks to their line of laboratory grade carbides. These include standard reamer, rectangular reamer and solid square tool blanks.

Rectangular and standard reamer blanks are designed in eleven sizes and in two grades. The solid square tool blanks range from 5/32 inch wide, 5/32 inch high and 1 inch long to 3/8 x 3/8 x 1 3/4 inch. Cutting edges are hot ground to 10 degrees, and the blanks are available in five sizes and in four grades.

For more data circle 84 on Reader Service Card

Prutton

THREAD ROLLING MACHINERY

9,000 Tubing Nuts Per Hour!

RUNNING 3 SIZES!

1/2" — 20 Thread — 5/16" Hole

7/16" — 24 Thread — 1/4" Hole

3/8" — 24 Thread — 3/16" Hole



This high speed production operation employed the Exclusive Prutton **MANDREL SYSTEM TO SUPPORT THE INSIDE DIAMETER.** Similar results can be achieved on your threading with Prutton Thread Rolling Machinery.

Submit your parts for our recommendations. No obligation.

Prutton Corporation

5298 WEST 130th ST.

CLEVELAND 30, OHIO

For more data circle 398 on Reader Service Card

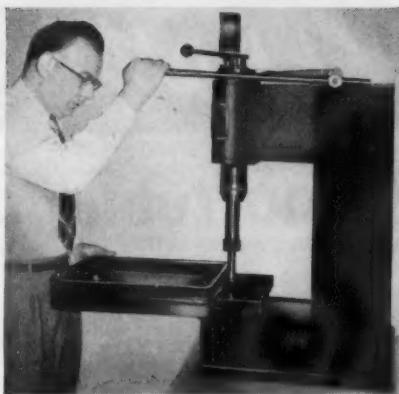
July, 1956

modern machine shop 237

new shop equipment . . .

BENCH ARBOR PRESS HAS 10 TON CAPACITY

The production of a 10 ton capacity bench arbor press, designated as the Model 137-BH, has been announced by K. R. Wilson Inc., Arcade, N. Y. The compact, low-cost press is designed to perform many types of opera-



Wilson Model 137-BH Bench Arbor Press

tions including blending, straightening, marking, punching and removing and replacing gears, bearings and bushings on motor shafts and other equipment. The press features Wilson's patented release valve for "finger tip" ram control and completely self-contained hydraulic cylinder. Press specifications include 6¾ inch hydraulic stroke and 12 inch maximum daylight opening.

For more data circle 85 on Reader Service Card

★ ★ ★

MAGNETIC CYLINDER SQUARE CHECKS SQUARENESS IN SECONDS

A magnetic cylinder square, that is said to enable the squareness of sur-



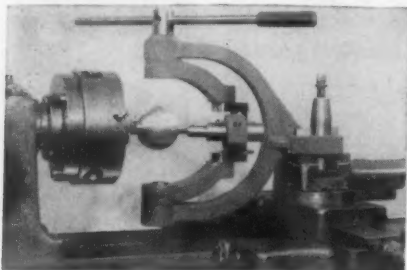
HAND KNOBS

6 SIZES CAST-IRON
Tapped, Reamed
or Blank
Hex-shaped hub for
extra tightening

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**TIETZMANN TOOL
CORPORATION**
ENGLEWOOD, OHIO

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For more data circle 389 on Reader Service Card



RADITURN CUTS ANY RADIUS Convex, Concave or Ball Patent No. 2716913

The accurate short cut for turning any radius. Adaptable to any lathe. Write for details. Territories available for responsible agents or distributors.

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1458 E. CLINTON • FRANKFORT, IND.

For more data circle 390 on Reader Service Card

238 modern machine shop

Now . . . carried in stock . .



**AND 10050
Porting Tools**

A complete line of carbide tipped combination ream, counter-bore and facing tools to machine standards. Combines 5 operations in one tool! Thoroughly proven.

WETMORE TOOL & ENGINEERING CO.
5320 E. WASHINGTON BLVD., LOS ANGELES 22, CAL.

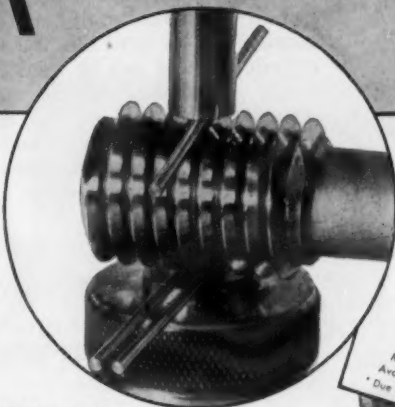
For more data circle 391 on Reader Service Card

July, 1956



THREAD MEASURING WIRES

▼ Standard equipment everywhere



Checking pitch diameter of thread gage by three wire method on VK Light Wave Micrometer.

**VK STANDARD
THREAD WIRES**
Now up to **75%**
INCREASED ACCURACY
IN YOUR P.D. MEASUREMENT
For all standard Unified and American
Threads 2 to 80 P
When you order the NEW
**VK CALIBRATED
THREAD MEASURING WIRES**
WITH **MATCHED CONSTANTS**
Max. Theor. Meas. P.D. Error* = .00015"
Available from stock at no increase in price.
* Due to effect of wire diameter



Set No. 20 H.S. Thread Measuring Wires

Every set of VK Standard Thread Measuring Wires, in addition to being within .000020" of best size, is now calibrated and furnished with matching constant. In many cases this will result in considerably more accurate pitch diameter measurements. These wires are the accepted standard equipment for making pitch diameter measurements of taps, thread gages, precision threaded parts, hobs, worms, splines and gears. For the great majority of 60° Unified and American threads, the Set No. 20 H.S. pictured at the right will fill your needs. Similar sets to $\pm .000020''$ accuracy are available for single-start threads of other pressure angles. For threads which have a lead angle greater than five degrees, or multiple-start threads and worms, special size wires should be used.

Set No. 20 H.S. Thread Measuring Wires is a plant necessity for maintaining taps and thread gages within their limits for wear and for proving the pitch diameter of screws and threaded parts.

Price, High Speed Steel Wires...\$135.00
Special wires from .002" to 2.000" diameter are made to any tolerance required.

Send for a copy of the new, 258-page Van Keuren Catalog and Handbook No. 36 containing valuable technical and engineering information on measuring problems and methods. Address:



37th YEAR

THE *Van Keuren* co.,

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Optical Flats . . . Light Wave Equipment . . . Light Wave Micrometers . . .
Gage Blocks . . . Wire Type, Taperlocks and Tri-Block Plug Gages . . . Master
Setting Disks . . . Thread Measuring Wires . . . Gear Measuring Wires . . . Carbide
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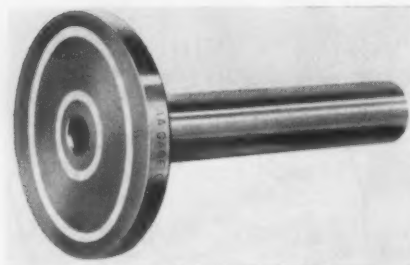


For more data circle 392 on Reader Service Card

July, 1956

modern machine shop 239

new shop equipment . . .



View of A A Gage Magnetic Cylinder Square

faces to be checked in a matter of seconds, has been announced by A A Gage Co., 350 Fair St., Detroit 20, Mich. According to the manufacturer, full 360 degrees of absolute squareness is provided by the device, which includes

powerful magnets that hold the face of the cylinder square to the surface that is to be checked.

Made of selected steel to insure stability and uniformity and sturdily constructed for hard use, the magnetic cylinder square can be used for practically any type of squaring operation. The standard size of the unit is 3 inches in diameter by 6 inches long. However, it is also available in a size 7½ inches in diameter by 14 inches long, on order.

For more data circle 86 on Reader Service Card

★ ★ ★

UNIVERSAL AIR FIXTURE LOCK PROVIDES FOR SPLIT SECOND CLAMPING

A universal air fixture lock, developed by the Wilton Tool Manufacturing Co., Schiller Park, Ill., provides split second clamping on six distinct appli-

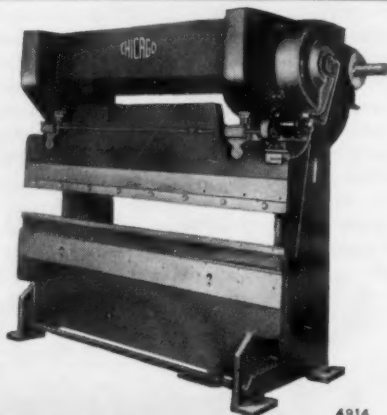


**STEEL
PRESS
BRAKES**

43 Standard Sizes

Readily adapted for a wide variety of bending, forming drawing, notching, blanking, punching, embossing, etc.

DIES Complete Line of Induction Hardened Dies for All Makes and Sizes of PRESS BRAKES.



4914

DREIS & KRUMP

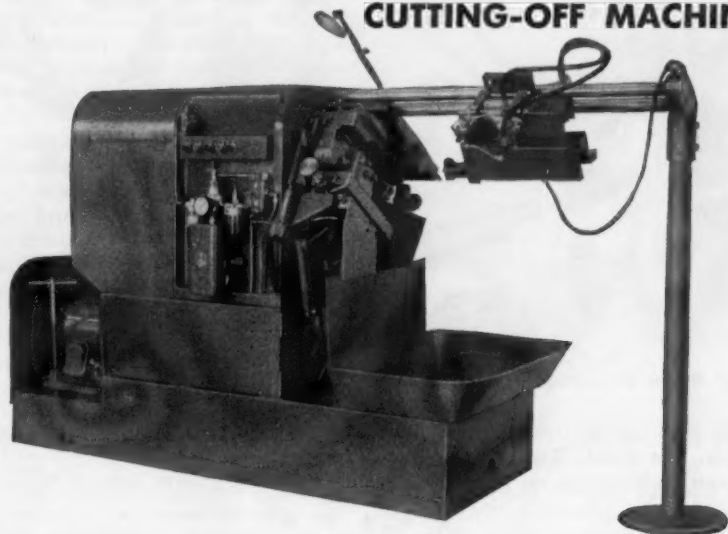
MANUFACTURING COMPANY

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For more data circle 393 on Reader Service Card

THE MODERN AUTOMATIC CUTTING-OFF MACHINE



Cuts Off Tubing, Pipe and Shafting... FAST

Cuts off longer pieces than a regular automatic machine. In fact, cuts off any length you want—and cuts it faster. If your production requires quantity cutting-off of tubing, pipe or shafting, check the figures below against your present time.

1/2" Tubing

This machine cuts off and chamfers both outside edges of 1/2" .030 wall tubing, 5" long at the rate of one every 2.5 seconds.

1 1/4" Cold Rolled

This machine cuts off and chamfers both ends of 1 1/4" cold rolled, 20" long, at the rate of one every 20 seconds.

1" Tubing

This machine cuts off and chamfers both outside edges of 1" tubing, 3" long, at the rate of one every 3 seconds.

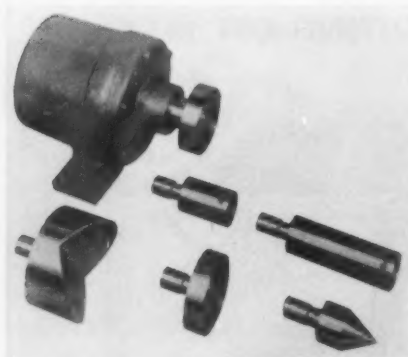
These popular, time saving machines are now available in four sizes, handling work up to 6 3/4" O.D. Their many cost cutting features are described and illustrated in our latest catalog that will be mailed promptly on request.

WRITE FOR ILLUSTRATED CATALOG

MODERN MACHINE TOOL CO.
Jackson, Michigan

For more data circle 394 on Reader Service Card

new shop equipment . . .



View of Wilton Universal Air Fixture Lock

cations, and can be used on any machine in the plant. Two of the new units can be mounted on a fixture, to

lock workpieces in position for a drilling operation. Other applications include moving one part of a fixture against another; pushing workpieces into cutters; loading or ejecting workpieces automatically; pressing parts into a workpiece; and moving parts of a machine, like drill press quills or the tail stock of a lathe.

The air cylinder of the fixture lock is machined to receive five interchangeable holding tools, which have $\frac{1}{2}$ inch undercut adapter shanks and can be locked in place with a $\frac{3}{32}$ inch socket set key. The cylinder can be mounted in any position, moved from job to job, and used with any of the five holding tools, or with specially made holding tools produced in the customers' own plant. Cylinders come in three sizes, with rated locking forces from 650 to 2,300 lb. p.s.i., and power strokes from $1\frac{1}{8}$ to $3\frac{1}{8}$ inches.

For more data circle 87 on Reader Service Card

★ ★ ★ ★ ★

GAGE HANDLES and BLANKS

available for
immediate
delivery

Also available
Trilock and Spline
Gage Handles

A. G. D.
Standards



Single End Go
Reversible
Gage Handle



Taperlock
Gage Handle

Double End Reversible
Gage Handle



Established 1938

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manufacturers of gage handles and blanks

For more data circle 395 on Reader Service Card

KENNAMETAL*

K7H

has a definite place in your operations

- for high-velocity machining
- for cutting heat-treated steels
- for cutting high tensile steels

Kennametal* Grade K7H is being selected by shop after shop for high-velocity cutting operations . . . chiefly because of these desirable cutting edge characteristics: High hardness (93.5 Rockwell A) combined with phenomenal strength (three times that of non-metallics); exceptional wear resistance and maximum resistance to cratering; excellent retention of strength even at high temperatures; and top resistance to shock.

HERE ARE EXAMPLES OF K7H PERFORMANCE

Doubles production: Cutting $1\frac{1}{2}$ " wide stators of welded laminations of 2% silicon steel, K7H has outperformed all other cutting edges by better than two to one, with 147 pieces averaged per index for K7H against only 65 pieces per index with the best competitive carbides. *Conditions:* 900 sfm, .0083" feed, and .015" depth of cut. *Results:* Higher total production at end of day, with less machine down time, less scrap, better quality by holding tolerances, and lower tooling cost per stator (\$0.00109).

Outperforms ceramics by more than 30 to one in test boring SAE 1020 steel,



Use Kendex Tooling with turn-over inserts (available in 17 styles and over 200 tools) . . . for lowest cost per cutting edge.

flash hardened, length of bore $1\frac{1}{4}$ ", depth .025" at 900 sfm. Grade K7H cut 67 pieces while ceramics only cut two (ceramics chipped). *Result:* K7H ordered for the operation.

K7H cuts 252 pieces as compared to 30 . . . the best record for a competitive carbide in facing cut to dead center of SAE 1018 steel 5" O.D. gear blank, at 1000 sfm (at outer edge) and .008" depth of cut. *Result:* Standardized on K7H.

Performance 3 times greater than with competitive carbide cutting cast steel stator housing with six interruptions at 700 sfm, .014" feed, and $\frac{1}{8}$ " depth of cut. *Result:* K7H was selected for the job.

Why not discuss your machining problems with a Kennametal tool engineer. He will help you take full advantage of this remarkable cutting grade. Call him or write KENNAMETAL INC., Latrobe, Pennsylvania.

*Registered Trademark



B-5807A

For more data circle 396 on Reader Service Card

July, 1956

modern machine shop 243

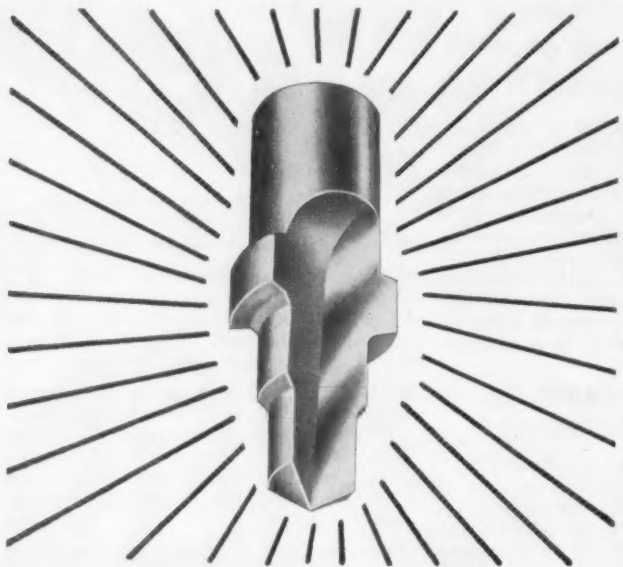
new shop equipment . . .

INFINITELY VARIABLE SPEEDS FOR SECOND OPERATION MACHINE

Desired spindle speeds can be achieved instantly by a simple touch of a button on the Model DSM59 second operation machine, manufactured by Hardinge Brothers, Inc., Elmira, N. Y. Spindle speed changes for rates be-

tween 230 and 3,500 r.p.m. can be made without stopping the machine. The operator can locate the best speed for the most efficient chip removal and surface finish by simply pushing the "faster" or "slower" button, found in a control box conveniently placed over the headstock. Simplicity in operating this high speed precision machine is said to enable relatively inexperienced operators to turn out parts within close tolerance and fine finish on a production basis.

According to the manufacturer, the Model DSM 59 makes it possible to chuck partially finished parts and rapidly do close tolerance turning, forming, boring, drilling, threading and facing with low cost tooling. The operations of this machine thus reduce upkeep, expensive tooling and down time of automatics. Other features which add to the machine's reputation as fast and economical include a special collet closer. This lever operated ball-bearing collet closer permits opening or closing a collet or step chuck while the machine is in operation. A full range of collet tension from light



This H.S.S. Ground Radial Relief Tool

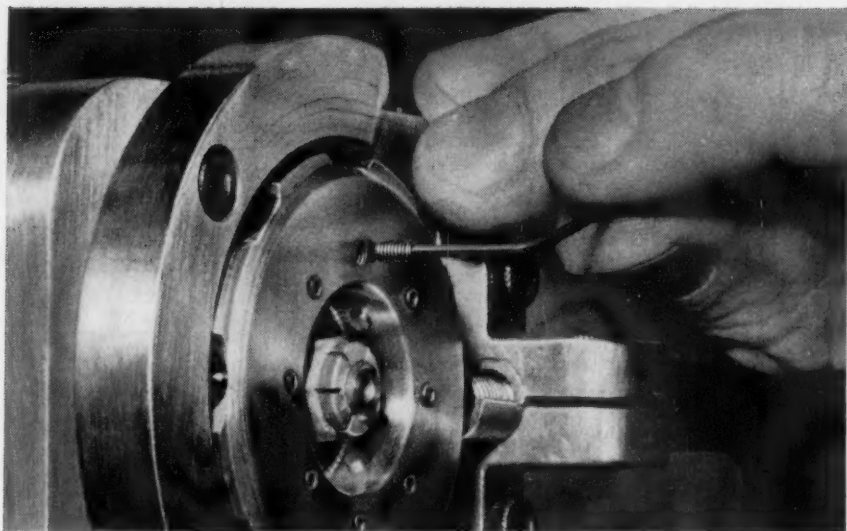
**Cut over 30,000 pieces
WITHOUT REGRIND—
on non-ferrous metal**

Send your blueprints for prompt quotations

B & W PRECISION PRODUCTS CO.

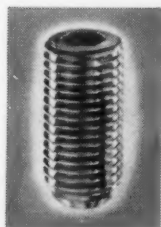
11393 E. Eight Mile Rd., P.O. Box 3865, Detroit 5, Mich.

For more data circle 397 on Reader Service Card



Microsize UNBRAKO socket screws simplify design problems—even in highly specialized equipment like this prototype precision loading device for use in advanced automated production operations.

Miniaturize with UNBRAKO set screws



You need not design special set screws to secure your new miniaturized equipment. Microsize UNBRAKOS were developed specifically for use in modern small devices.

UNBRAKO screws are made of carefully selected alloy steel. They are manufactured to timepiece precision. Sockets are deep and uniform for greatest wrench

engagement and longest reuse. Threads are fully formed for maximum strength and exact fit. And UNBRAKOS are heat treated to the optimum condition for high tensile strength and ductility without brittleness or decarburization.

Ask your authorized industrial distributor about microsize UNBRAKO socket screws today. Or write us for Bulletin 2055 and samples. Unbrako Socket Screw Division, STANDARD PRESSED STEEL CO., Jenkintown 22, Pa.

STANDARD PRESSED STEEL CO.



SOCKET SCREW DIVISION



JENKINTOWN PENNSYLVANIA

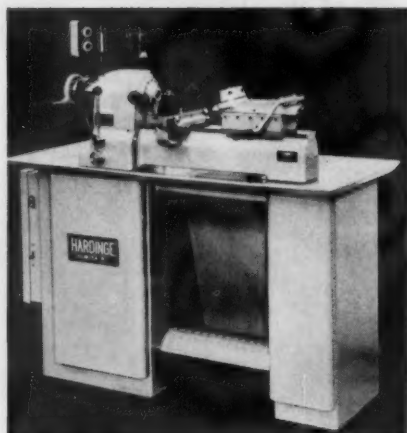
For more data circle 396 on Reader Service Card

July, 1956

modern machine shop 245

new shop equipment . . .

to heavy holding power is said to be possible without use of extra tools. When fitted with the new 5C round Hardinge collet, this machine has an extra large 1 1/16 inch capacity. A preloaded ball bearing turret head mounting is claimed to eliminate all



Hardinge DSM59 Second Operation Machine

play between the turret head and turret slide. When less than six operations are performed, time savings can be made with the adjustable operating lever to allow rapid swiveling past the positions which do not have tools.

For more data circle 88 on Reader Service Card

★ ★ ★

THREE SIDED VISE FOR PRODUCTION WORK

The newest addition to the growing line of precision holding devices by Heinrich Tools, Inc., Racine, Wis., is the Model TS (three sided) Grip-Mas-

REID

TOOL ROOM ACCESSORIES

C. I. HAND WHEELS



SOLID WEB



COUNTER BALANCED

Solid web in dished and straight types. Also counter-balanced. Fine grain cast iron. Rims and handles ground to high lustre. Many sizes. Low prices.

Also hand knobs, ball handles, machine handles, etc. High quality. Low prices.

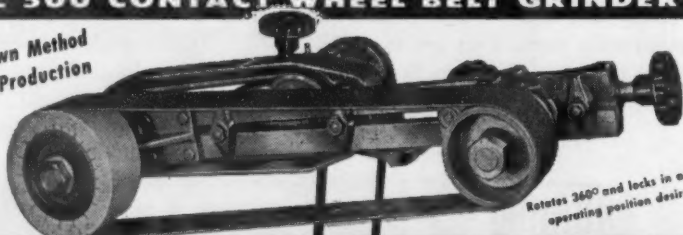
**FREE
60-Pg.
CAT.**

**REID TOOL SUPPLY CO.
MUSKEGON HEIGHTS, MICHIGAN**

For more data circle 399 on Reader Service Card

MODEL 500 CONTACT WHEEL BELT GRINDER

*The Fastest Known Method
of Increasing Production*



*Rotates 360° and locks in any
operating position desired.*

WRITE FOR COMPLETE INFORMATION
ON INCREASING YOUR PRODUCTION

B & E MFG. CO., INC.

2104 EAST 31 STREET
KANSAS CITY 9, MISSOURI

For more data circle 400 on Reader Service Card

**INCREASES
PRODUCTION...**

LOWERS COSTS...

**PAYS FOR ITSELF
QUICKLY...**

The ROUSE HAND MILLER is a widely used, inexpensive, high speed, ball bearing, motor driven machine for handling light cuts in brass, aluminum, steel, plastics, and other materials—fast, accurately, and at very low cost. Only \$110.00*

Fixtures (illustrated) extra.

Motor equipment:— $\frac{1}{4}$ H.P., 110 Volt AC 60 cycle, single phase, swivel motor mount and light—\$36.00*

*All prices FOB Chicago.



- ★ **MILLS SMALL PARTS MUCH FASTER.**
- ★ **DRASTICALLY CUTS YOUR INVESTMENT IN EQUIPMENT.** Replaces expensive production machinery—or releases it for other jobs.
- ★ **INEXPERIENCED HELP CAN OPERATE IT.** Safe, simple, fool-proof operation.
- ★ **NO MORE COSTLY SET-UP TIME. \$110.00*** price so low that it pays to keep one or more Hand Millers always set-up for special operations.
- ★ **YOU GET A BETTER PRODUCT**—the result of ABSOLUTE ACCURACY.
- ★ **A LOSS BECOMES A PROFIT** when marginal pieces are finished on the Hand Miller instead of on high cost equipment.
- ★ **VERY LOW MAINTENANCE.**
- ★ **USED REGULARLY IN 1163 MANUFACTURING PLANTS** (some of which use as many as 30 machines)—yet on the market a scant few years.
- ★ **UNIQUE—VERSATILE.** Nothing else like it. One or several machines can be the answer to some of your production problems.

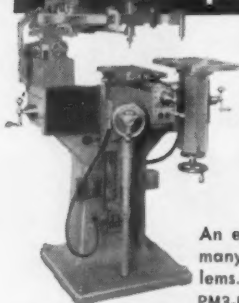
**Write today
for further
information.**

H. B. ROUSE & COMPANY

2214 N. WAYNE AVE., CHICAGO 14
50 YEARS OF SERVICE TO INDUSTRY

For more data circle 401 on Reader Service Card

3-Dimensional panto-miller



Accurate panto-graphic milling on either flat or curved surfaces.

New

**CAPACITY
SENSITIVITY
ACCURACY
CONTROL**

An economical answer to many production problems. Send for Bulletin PM3-B.

2-Dimensional panto-miller



Versatile and dependable for continuous service, the J&B "Panto-Miller" 2A:

**ENGRAVES
PROFILES
DIE CUTS
MILLS**

Write for Bulletin PM2-B.

3-WAY Indexing Trunnion

Simple, Rapid, Positive positioning of workpiece or jig for all angle Drilling, Tapping, or Counter-boring. Available with Chuck, Faceplate, or Right-Angle Adaptor Plate. Complete with Station Selector. For details, ask for Bulletin IT3-B.



WITH
FACE
PLATE



WITH
RIGHT ANGLE ADAPTOR



JOHNSON & BASSETT INC.
PRODUCTION TOOL DIVISION
WORCESTER, MASSACHUSETTS

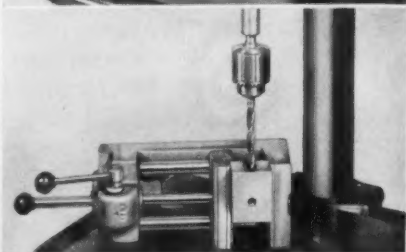
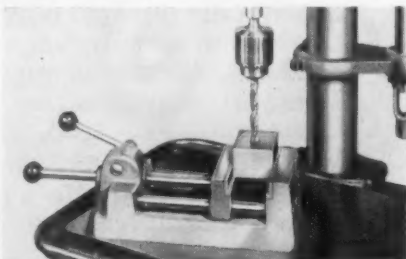
For more data circle 402 on Reader Service Card

new shop equipment . . .

ter vise and fixture base for rapid fire production work. Jaw sides are precision-ground at right angles to parallels for accurate machining from both the top and sides without any resetting of the work.

The new TS Series Grip-Master is being offered in two sizes, with 3 or 4 inch jaw widths and with a choice of either the standard "SV" locking mechanism for general vise and fixture work, or with the "PA" series locking mechanism which enables the operator to advance the jaw forward by "pumping" the locking lever. This locking mechanism is claimed to make possible a speed of operation that is almost unbelievably fast in routine drilling and the handling of small parts. The TS Series Grip-Master is said to be ideal for use as base structures for jigs and fixtures.

For more data circle 89 on Reader Service Card



Model TS Grip-Master Vise and Fixture Base



**NEW
ABRASIVE SCREEN
MADE WITH AVISCO RAYON
OUTLASTS ORDINARY
DISCS 7 TO 15 TIMES**

Working with The Carborundum Company, American Viscose helped develop a revolutionary sand screen to replace conventional abrasive discs. It has a useful life 7 to 15 times greater for two reasons: First, the removed material flows out through the open mesh. Second, it is made from Avisco filament rayon yarn that stays "young and muscular" even when loaded with phenolic resins and abrasives. The result is an abrasive far more useful to you.

American Viscose Corp.,
350 Fifth Avenue, New York 1, N.Y.

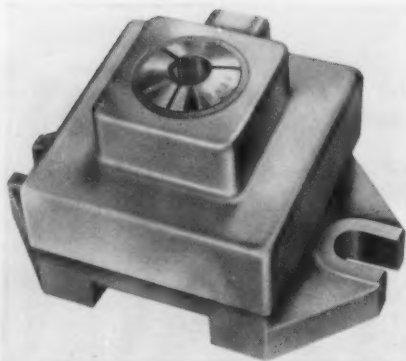
AVISCO

America's Greatest Industries Grow with **AVISCO®**
For more data circle 403 on Reader Service Card

new shop equipment . . .

AIR-OPERATED COLLET FIXTURE

The Beckett-Harcum Co., Wilmington, Ohio, is producing an air-operated collet fixture that will simplify secondary operation work on parts that can be chucked in a standard 5-C, 1 inch diameter maximum capacity collet.



View of "Air-Pal" Air-Operated Collet Fixture

Larger diameter step collets can be used for special applications. Known as the "Air-Pal," the collet provides positive two-way power and has a 750 pound pull at 100 lb. air pressure. According to the manufacturer, the fixture is built with precision, using lightweight materials and non-corrosive interior construction. Weight with collet is 4 pounds. Unit is 3½ inches high, 4 inches wide and 6½ inches long.

For more data circle 90 on Reader Service Card

★ ★ ★

COMPACT WALKIE TRUCK

A new idea in "Walkie" Electric Trucks has been announced by The Raymond Corp., 88-136 Madison St., Greene, N. Y.

The design of the walkie truck fea-

HOWALD CARBIDE MILLING CUTTERS



PATENTED
END MILL

- SQUARE BLADES Easily Replaced.
- Simple, Accurate Blade Adjustment.
- Lowest Blade Cost.
- Cutters from 1½" to 14" dia.



PAT.
SHELL
MILL

SEND FOR BULLETIN

W. T. HOWALD MACHINE WORKS

182 SIGOURNEY ST., BROOKLYN 31, N. Y.

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SPECIMEN

With DYKEM Steel Blue Without DYKEM Steel Blue

DYKEM STEEL BLUE

Stops Losses

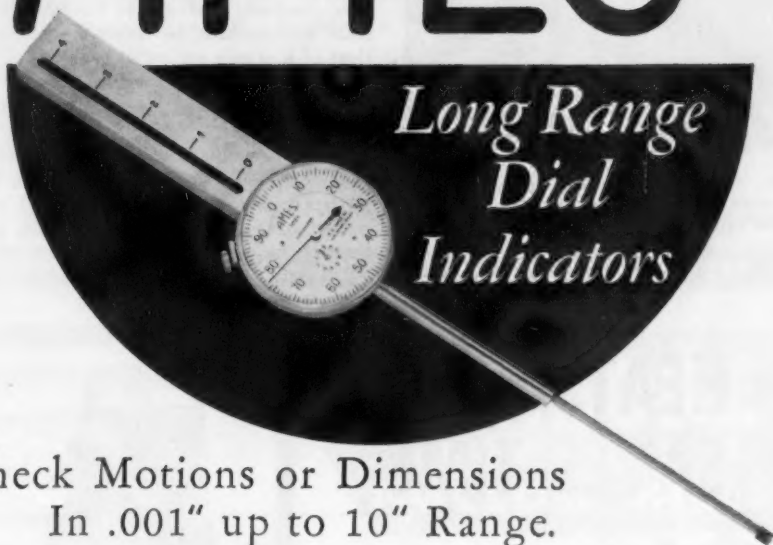
making Dies and Templates

Popular package 8-oz. can fitted with Bakelite cap holding soft-hair brush for applying right at bench; metal surface ready for layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, prevents metal glare. Increases efficiency and accuracy.

Write for sample on company letterhead
THE DYKEM COMPANY
2301F North 11th St. • St. Louis 6, Mo.

For more data circle 405 on Reader Service Card

AMES



Check Motions or Dimensions In .001" up to 10" Range.

With Ames Long Range Dial Indicator models you can measure in .001", long slide travel, large cams, deep recesses or other dimensions requiring indicator spindle travel of up to 10". Also they have all the advantages built into Ames regular indicators:—large diameter dials, widely spaced dial graduations; movable dials; replaceable contacts, count hands to indicate revolutions of the indicator hand.

Send your problem in long range measuring, Ames will be glad to suggest a solution.

Representatives in principal cities



B.C. AMES CO.

29 Ames Street, Waltham 54, Mass.

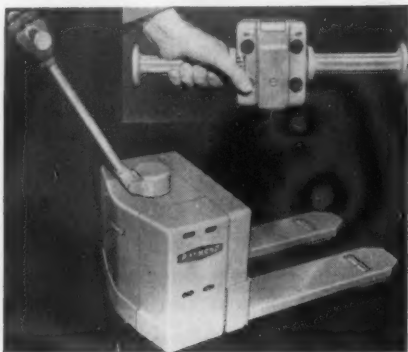
MANUFACTURER OF MICROMETER DIAL GAUGES • MICROMETER DIAL INDICATORS

For more data circle 406 on Reader Service Card

July, 1956

modern machine shop 251

new shop equipment . . .



View of Raymond Walkie Electric Truck

tures compactness. The overall length is 20½ inches greater than the load length, making this model extremely

short and also readily maneuverable.

New safety features have been incorporated in the truck to provide protection for the operator at all times. For instance, a special safety button on the end of the handle instantly puts the truck into the reverse direction when it presses against the operator.

A unique power pack consisting of four automotive type batteries provide 24 volt operation with no resistance loss in second and third speeds. The manufacturer states that the energy in four automotive batteries will equal that of a single industrial battery. The four batteries can all be charged at the same time without being removed from the chassis.

Other specifications of the walkie truck include three travel speeds; fingertip controls for travel, lift and lowering; easy maintenance; smooth pallet entry and lightweight design.

For more data circle 91 on Reader Service Card

★ ★ ★ ★ ★

HEATS FAST SAVES TIME

johnson

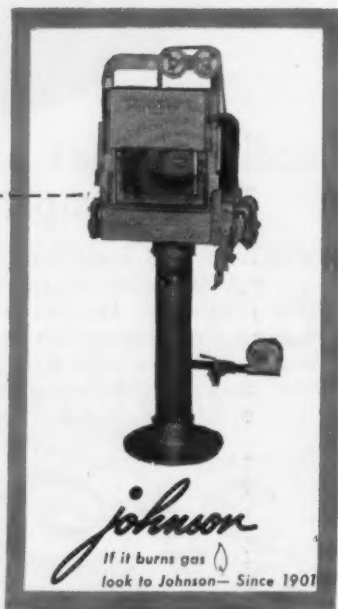
NUMBER 142 HEAT TREATING FURNACE

Powerful burners in this efficient furnace get heat up to the 1300°-2350° F. range in minutes. Temperatures accurately and quickly regulated. Does fast job with high speed and carbon steels. Ratchet-operated door opens upward. High temperature, refractory-lined firebox is 7" by 13" by 16½". 200,000 BTUs per hour. Carbofrax hearth, G.E. Motor and Johnson Blower included, F.O.B. Factory ...\$337.00

Write today for free Johnson Catalog

JOHNSON GAS APPLIANCE COMPANY
571 E Avenue NW, Cedar Rapids, Iowa

For more data circle 407 on Reader Service Card



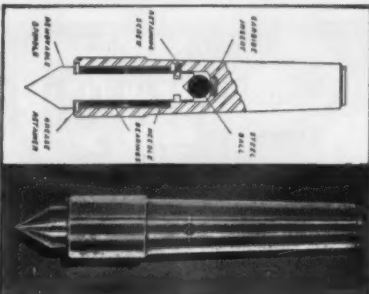
Turning accuracy to .00015 max.

WEE LIVE CENTERS

While the Wee is an all purpose center, its SMALL HEAD fits it for special setups as, in swing turrets, grinding operations, small gear cutting, etc. Test one—money back if center does not prove its worth in 24-day trial. No. 2, M.T. \$21.00. No. 3, M.T., \$24.00. Write for complete price list, many sizes, tapers, shanks, also request NEW bulletin.

Write direct, if distributor cannot supply you.

HERBERT CROSS & SON, Bala-Cynwyd 1, Pa.



For more data circle 408 on Reader Service Card



IN 11 SIZES—No. 6 to 1"
N.C. In all S.A.E. sizes.



*You Need an Extra Hand Now
to Speed Up Production!*

HEIMANN TRANSFER SCREW SETS

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money too!

HEIMANN MFG., CO. • URBANA, OHIO

For more data circle 409 on Reader Service Card

**Greater
Precision!
Increased
Production!**

KUTMORE ADJUSTABLE HOLLOW MILLS

Any combination of . . . turning . . . tapering . . . facing . . . chamfering . . . trepanning in one pass. Exclusive micrometer adjustment feature for rapid set-up. Cutting capacities from 1/32" to 2" diameter in standard stock.

WRITE FOR CATALOGUE No. 20MM

Our engineering department is at your disposal on your hollow mill problems.

CARL WIRTH & SON, INC.

1625 CLINTON AVE. NO.
ROCHESTER 5, N. Y.



For more data circle 410 on Reader Service Card

**Great
Buys
For**

VICTOR'S 25TH ANNIVERSARY YEAR

Our Special Import . . .

DIAMOND WHEEL DRESSERS

Made of selected, full individual stones, mounted in 7/16" diameter x 6" long cold rolled shank.

Karat	Regular Price	Our New Price
1/4	\$ 6.00	\$ 2.85
1/2	12.00	5.00
3/4	21.00	7.50
1	30.00	10.25
1 1/2	54.00	15.00
2	75.00	20.00
2 1/2	102.00	26.00
3	130.00	32.00

These diamonds can be set in any shank to your specifications for \$1.00 each extra.

**Order today—Immediate
Delivery From Stock!**

VICTOR

MACHINERY EXCHANGE, INC.

Dealers in Tool Room Equipment

Dept. B, 251 Centre St.

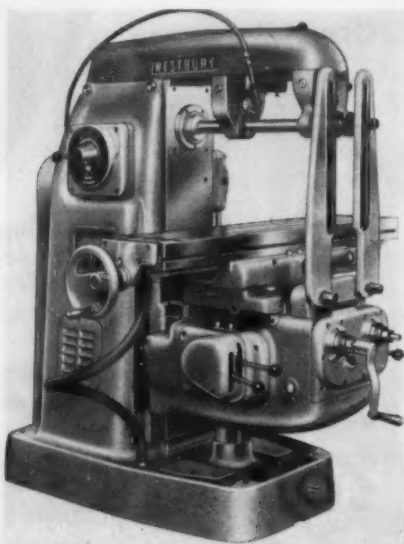
Tel.: CAnal 6-5575, New York 13, N. Y.

new shop equipment . . .

UNIVERSAL DIAL TYPE MILLING MACHINES

Aaron Machinery Co., Dept. M, 45 Crosby St., New York 12, N. Y., has announced the new Westbury line of universal dial type milling machines, which feature hardened and ground spindle and gears, tapered roller bearings, clinch milling and scraped ways.

Designed for power, speed and precision control, the Westbury line consists of three horizontal universal milling machines—1-U, 2-U and 3-U. Other features include heat-treated, hardened chrome-nickel spindle with all working parts designed to withstand an overload of more than 100 per cent. The same lever operates both the multi-disc clutch and brake for the spindle control. There are 12 spindle speeds from 28 to 1,100 r.p.m., with dial and hand control for selecting and



Westbury Universal Dial Milling Machine

For more data circle 411 on Reader Service Card

254 modern machine shop

July, 1956

WALLS TU-WAY BELT SANDER



Full
1/3 h.p.
G. E. Motor

USE IT
EITHER WAY

HORIZONTAL

VERTICAL

At last, a top quality industrial sander that provides all the most wanted features—yet sells for so little. **\$89.95** complete with cord, plug, switch ready to use

Illustrated Literature on Request
A few desirable distributor territories still available.

WALLS SALES CORPORATION
333 Nassau Avenue Brooklyn 22, N. Y.

For more data circle 412 on Reader Service Card

"PAK-N-STAK"

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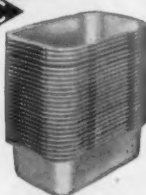
*The most economical LEAKPROOF,
LIGHTWEIGHT, DRAWN TOTE PAN offered to industry*

OUTSIDE DIMENSIONS

DEEP — 5½"

LONG — 18¼"

WIDE — 10½"



There are 25 Nested Tote Pans in Above Photo ↑
WRITE FOR CATALOG AND PRICE

BATHEY MFG. CO.

100 SO. MILL ST.

PLYMOUTH, MICH.

For more data circle 413 on Reader Service Card
July, 1956

LIVE CENTER
ACTION WITH
DEAD CENTER
ACCURACY

USE



ANTI-SCORING
LUBRICANTS



PROVE IT TO
YOURSELF IN
YOUR OWN PLANT FOR ONE
DOLLAR AND THIS COUPON!

Free-running on dead centers—with COMPLETE protection. CMD Lubricants are CONCENTRATED, form a "tough" film—absolutely NO GALLING or SEIZING—under the heaviest load. STABILIZED for added "oiliness" giving longer, smoother runs without slip-stick action. It all adds up to LIVE CENTER ACTION with DEAD CENTER PRECISION. The bigger the job, the better you'll like it.

TRIAL ORDER—
TWO FOUR OZ. TUBES \$1.00

Send me my order of CMD right away!
Bill me ☐ Bill my company ☐

Name _____

Company Name _____

Address _____

City _____ State _____

Chicago Manufacturing and Distributing Co.
1910 West 46th St., Chicago 9, Illinois

**CHICAGO MANUFACTURING
AND DISTRIBUTING CO.**

For more data circle 414 on Reader Service Card
modern machine shop 255

new shop equipment . . .

reversing. Power is transmitted from the spindle gear box to the feed box in the knee through a vertical shaft mounted on tapered roller bearings. The feed box operates in oil with all feeds selected by dial with a single hand control. All movements can be controlled and operated separately or simultaneously. A single lever will engage the rapid traverse to the longitudinal, transverse and vertical feeds by means of a tapered clutch.

For more data circle 92 on Reader Service Card

★ ★ ★

BARREL HANDLING TRUCK LOADS DRUMS ON PALLETS

A drum and barrel truck, which is said to make it possible for one operator to easily place heavy drums on pal-



"Ezy-Rol" Drum and Barrel Cart in use

lets, has been announced by Valley Craft Products, Inc., 770 Jefferson Avenue, Lake City, Minn. Designated



FREE—New Bulletin T-1 shows, describes
VAILL tube end forming machine
VERSATILITY for . . .

Beading • Flaring • Flanging
Sinking • Expanding • Grooving
Threading • Reducing
• Double Lap Flaring
• Double Lap Flanging
on Tubing up to 6" Diam.



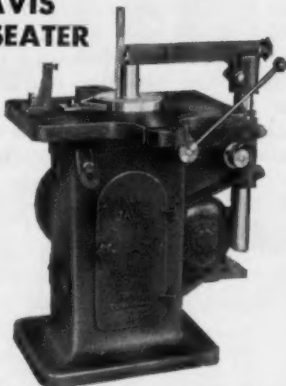
THE VAILL ENGINEERING CO. 133 E. MAIN STREET WATERBURY 20, CONN.

For more data circle 415 on Reader Service Card

Why Use A Shaper to cut Keyways when a DAVIS KEYSEATER

will
do the
job so
much
quicker
and
better?

Send
for
Circular



DAVIS KEYSEATER CO.

Exchange and Glasgow Sts.
ROCHESTER, N. Y.

For more data circle 416 on Reader Service Card

GRANT RIVETERS



• Pioneers in the riveting field. Head rivets from smallest to $\frac{3}{4}$ " diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. Write for literature — and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
96 Silliman Ave. . Bridgeport 5, Conn

For more data circle 417 on Reader Service Card

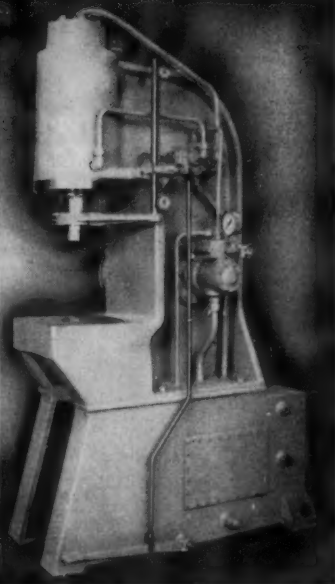
Greenerd HYDRAULIC PRESSES

- for
- ASSEMBLING
 - BROACHING
 - FORMING
 - MOLDING
 - STRAIGHTENING

Hydraulic presses made to conform to
J.I.C. standards. Pictured at right is 15-
ton hydraulic press.
Write for Catalog 554.

GREENERD ARBOR PRESSES

NASHUA • EST. 1883 • NEW HAMPSHIRE

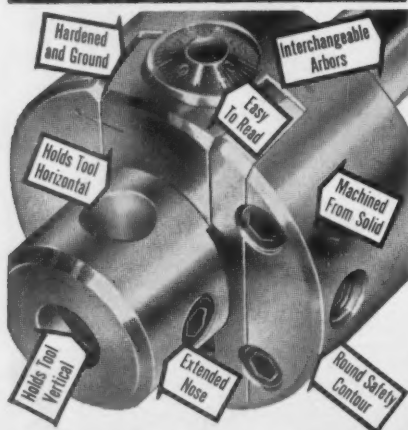


For more data circle 418 on Reader Service Card

new shop equipment . . .

as the "Ezy-Rol" Barrel Cart, the manufacturer states that the design of this cart allows the truck's shoes to be placed on edge of the pallet so that in one forward motion the drum can be elevated to the pallet with a minimum

FLYNN BORING HEADS



**LEADING NAME IN
BORING HEADS FOR 40 YEARS**
19 MODELS Write for catalog

FLYNN MANUFACTURING CO.
133 FLOWERDALE AVE. • DETROIT 20, MICH.

For more data circle 419 on Reader Service Card

of operator effort. It is also said that drums can be safely lowered from pallets with this cart.

Another feature claimed for this cart is its spring operated chime hook, which drops over the barrel edge as the truck is moved against the barrel without the operator touching either the hook or the barrel. The main frame of this barrel truck is said to be constructed from heavy steel tubing with a 1 inch diameter axle. It is also available in aluminum where light weight is a factor, such as in delivery service. Wheels are equipped with ball bearings to provide easy rolling, regardless of temperature or weather.

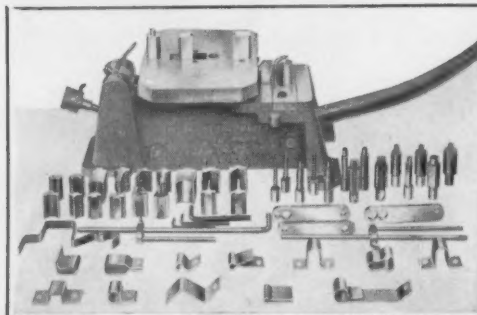
For more data circle 93 on Reader Service Card

★ ★ ★

HIGH TITANIUM CARBIDE

A tough, easy-to-grind, high titanium carbide with nickel binder, which promises to improve tool life in precision finishing and boring of steels, has been announced by Carboly Department of General Electric Co., Detroit 32, Mich. According to the manufacturer, tests have shown the new carbide to be extremely tough wear resistant. It's transverse rupture strength is about 200,000 p.s.i. with hardness about 91.5 Rockwell A.

The new composition, designated as Grade 330, can be easily produced consistently to provide a uniform struc-



Multiform

BENDER CUTTER

Users report the Multiform Bender one of the handiest tools in the shop. No special tooling . . . Bends, Cuts, Punches, Flats, Rounds into Any Shape, Clamps, Brackets, Springs, Busbars, Wire Forms, Aircraft Work, Steel Rule Dies, Etc.

**AIR OR HAND MODELS FOR UP TO
1/4" to 4" MATERIAL**

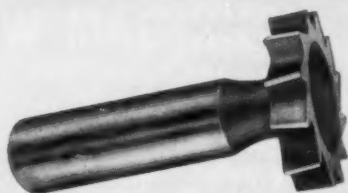
Write for brochure which illustrates and describes the four bender models.

J. A. RICHARDS CO.

Dept. 6-M

Kalamazoo, Mich.

For more data circle 420 on Reader Service Card



STAGGER TOOTH WOODRUFF CUTTERS

- STANDARD STOCK ITEM
- STANDARD PRICES
- SMOOTHER CUTTING
- LONGER LIFE

Recommended for cutting tough,
hard to machine materials.

Agents' and Jobbers' Inquiries Welcome

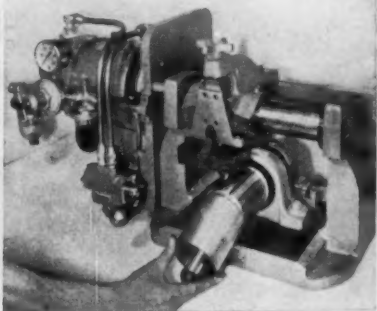
QUALITY TOOL WORKS

792 S. MARKET ST. • WAUKEGAN, ILL.

For more data circle 421 on Reader Service Card

MARK 500 or more parts per hour

Trade-Mark, Number, Graduate



WRITE FOR 9AA Data today.

"The
Original
Marking
Specialists"

ACROMARK
Company
9 Morrell St.
Elizabeth, New Jersey

For more data circle 422 on Reader Service Card

LEITZ OPTI-COMPARITOL

An amplifying gage of semi-optical design for gaging
outside dimensions, lengths and thicknesses precisely
and rapidly.

Its unusual design makes it sensitive enough for the finest tool
and gage inspection, with the necessary ruggedness for fast,
day in - day out - production inspection.

Brightly illuminated screen makes the readings unmistakable, at
a glance. Adjustable red tolerance shield shows undersize pieces
and green tolerance shield shows oversize pieces.

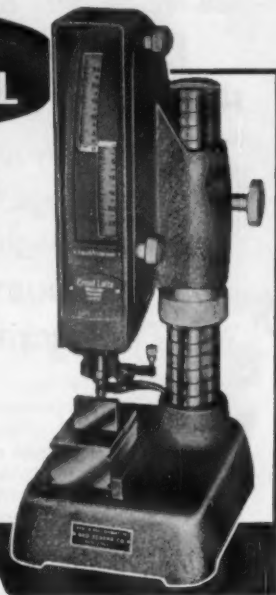
If it's White - It's Right

**Reads in .00005" - Range $\pm .005$ "
Capacity 6"**

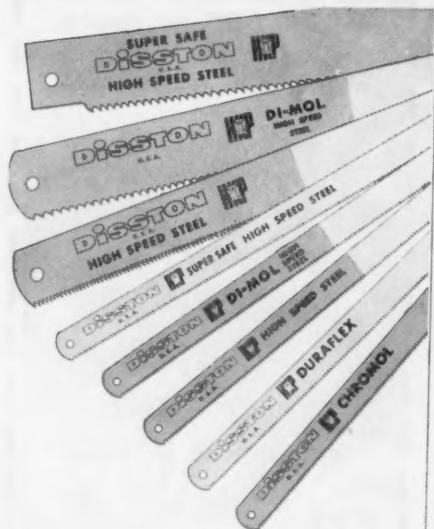
WRITE FOR COMPLETE LITERATURE
In certain territories inspection may be arranged

Geo. SCHERR OPTICAL TOOLS, Inc.

200-MM LAFAYETTE STREET • NEW YORK 12, N. Y.



For more data circle 423 on Reader Service Card



For easy, economical
machine shop cutting
use one of these 8 sturdy
DISSTON
HACK SAW BLADES

They cut easily...resist
wear and breakage. Get
them through your

**INDUSTRIAL
DISTRIBUTOR**



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LATEST CATALOG AND
HACK SAW SELECTOR
TODAY.

**Henry DISSTON DIVISION
H.K. PORTER COMPANY, INC.**

721 Tacony, Philadelphia 35, Pa.



For more data circle 424 on Reader Service Card

260 modern machine shop

new shop equipment . . .

ture. In the finishing area of machining, the new addition takes up where Grade 350 leaves off.

Due to its structure and added toughness, the new carbide is said to be less susceptible to chipping or cracking during brazing, grinding or in use. It can be ground easily on duplicating type grinders and, if accidentally crowded while grinding, it will not crack readily.

When used as a brazed tip, however, the new carbide requires the use of a special flux to provide proper wetting. According to company engineers, a silicon-bearing type flux used with generally available, lower-melting-point, high silver solders provides satisfactory results.

For more data circle 94 on Reader Service Card

★ ★ ★

REPAIR KIT FOR STRIPPED THREAD REPAIR

The Groov-Pin Corp., 1135 Hendricks Causeway, Ridgefield, N. J., has announced that its Tap-Lok Inserts are, for the first time, available in repair kit form to provide an economical, easy and practical method of repairing worn, damaged and stripped threads. These inserts are self-tapping steel bushings, internally and externally threaded, which increase the thread-holding strength of aluminum, magnesium, brass, plastics, cast iron and other materials which are machinable, but have insufficient shear strength to hold, under stress loads, fastenings used in them directly. With the kit, it is stated that damaged threads can be repaired in two easy steps—drilling the hole and driving the insert. The Tap-Lok Repair Kit includes a quantity of inserts in the thread size chosen, a driving tool and easy-to-follow instructions.

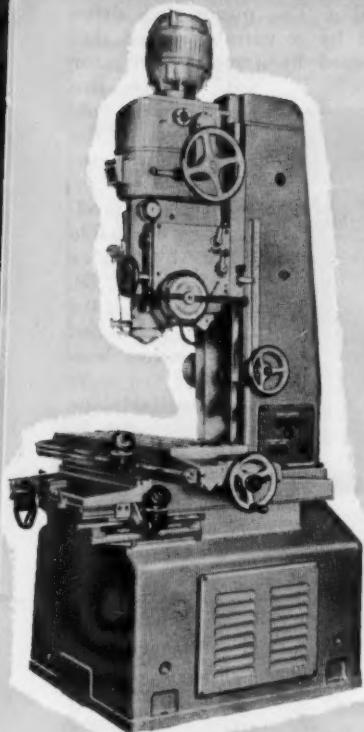
For more data circle 95 on Reader Service Card

July, 1956

OUTSTANDING NEW MACHINERY

*for greater
precision... quality...
dependability...*

AT LOWER COST!



STARRETT Optical Jig Borer

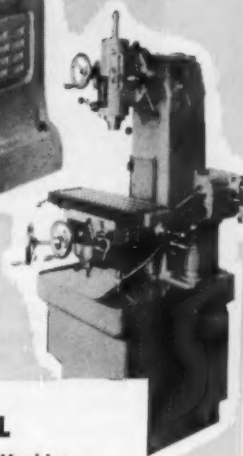
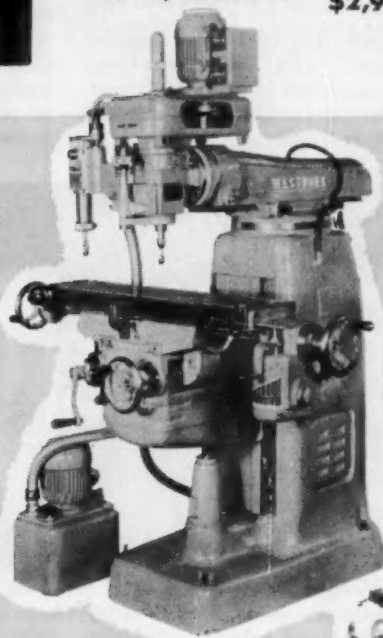
Working surface of table	35" x 12 1/2"
Longitudinal travel	19 1/2"
Range of spindle speeds	Infinite 70 to 1300 rpm
Net weight (approx.)	5,500 lbs.

CONTOUR MILLER

milling machine with hydraulic high speed vertical duplicating head.

- For efficient die sinking operations in reproducing dies, molds, etc.
- For milling complex profiles and other intricate shapes.
- Sensitivity to 0.00012

\$2,990.00



IMPERIAL

High efficiency Vertical Milling Machine... with automatic longitudinal table travel, for precision workmanship. Sturdy design, heavily ribbed frame, head practically free of noise and vibrations. Main spindle and transmission gears of hardened high grade steel. Vertical head swivels in each direction up to 90°.

\$1595.00

Dealer Inquiries Invited
LIBERAL TERMS
RENTAL PLANS

AARON MACHINERY CO. Inc.

Dept. M, 45 Crosby St., N. Y. 12, N. Y. • Walker 5-8300

new shop equipment . . .

HIGH-SPEED DUAL-RAM BROACHING MACHINE LINE WITH RACK AND PINION DRIVE

A complete line of 15-ton capacity "ElectroGear" dual ram vertical broaching machines has been announced by Colonial Broach and Machine Co., P.O. Box 37, Harper Station, De-

troit 13, Mich. Outstanding feature of the line is that its exceptional smoothness is achieved through helical pinion rack drives and balanced power loading, made possible through the interaction of the ascending and descending rams. This smoother flow of power to the tool gives broached surfaces improved finish with 50 to 100 per cent faster cutting stroke than was previously possible. The pinion-rack drive is powered by a variable speed d.c. motor powered by a motor generator

set. While one ram is on the cutting stroke, the other ram is returning.

Five basic models are available with stroke lengths of 54, 66, 80, 90 or 100 inches. Hardened and ground box-type or vee ways are available on all five models. Broaching speeds up to 80 feet or more per minute, as required, are available.

Massive rigid internally ribbed construction plus Colonial's "ElectroGear" drive are claimed to contribute to the smooth operation of all machines in the line. Ram speed is infinitely variable between minimum and maximum limits to give optimum broaching speeds for any particular operation or mate-

Prevent measurement errors, save time, save money and pay no premium: DoALL "A" Grade gage blocks, with guaranteed tolerances of plus .000004, minus .000002 are now available at "B" Grade ($\pm .000008$) prices!

Every set accompanied by Certified Inspection Report showing calibrated size of each block! Precise calibration made possible by guaranteed 0 to 0.09 RMS surface finish which also eliminates abrading when blocks are wrung together. Exclusive "burr-proofing" adds life and helps maintain accuracy.

DoALL has discontinued "B" grade blocks. Find out why they can't do today's measurement job. Call your local DoALL Store or write:

FREE: DoALL Gage Block Catalog lists square and rectangular sets—5 to 121 pieces—"A", "AA" and new "AAA" grades. Also describes accessories for assembling fixed and indicating gages. Call your local DoALL Store or write for your copy.

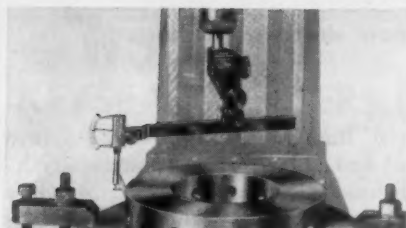


The DoALL Company

Des Plaines, Illinois

GB 20B

For more data circle 426 on Reader Service Card



OSLUND UNIVERSAL INDICATOR MICRO ADJUSTING HOLDER

INDICATOR HAS:

1. 360° Reading Face
2. Shockproof Mechanism
3. Constant Accuracy

HOLDER IS

Equipped with two screws...one for approximate setting, the other for final adjustment. A turn of swivel clamp and indicator works to 5" diameter... with extension bar to 15".

SEND ORDERS AND INQUIRIES TO OUR

National Distributor:

NICKSON TOOL SALES CO.

170 WASHINGTON AVE., NORTH HAVEN, CONN.

Representative Inquiries Invited, Territories Available.

Manufactured by:

OSLUND PRECISION PRODUCTS

15 SIGOURNEY STREET • HARTFORD 5, CONN.

For more data circle 427 on Reader Service Card

Extra Capacity with **hall COLLET CHUCKS**

for
**SPEED,
ACCURACY,
ECONOMY**



Automatic adjustment speeds up production in multiple operations with push-out type HALL COLLET CHUCKS. Full spindle capacity or over.

Tremendous grip over or under stock size.

Without adjustments. Shortest overhang. All grip...no slip. No bearings...no heat or lost power. Instant release without stopping lathe.

SATISFACTION GUARANTEED!

Made in Three Sizes to Fit Your Requirements:

Model A...1" (max. capacity 1-1/16")

Model B...2" (max. capacity 2-1/16")

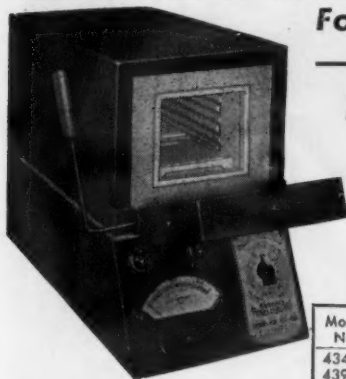
Model C...3" (max. capacity 3 3/4")

Write today for illustrated catalog and price list—Dept. 8-7

HALL MANUFACTURING COMPANY

622 TULAROSA BLVD., LOS ANGELES 26, CALIFORNIA

For more data circle 428 on Reader Service Card



• Write today for literature on complete line of Huppert furnaces and ovens in floor and bench models.

• Ask for Hints on Heat Treating.

For Heat Treating Small Parts **HUPPERT** **DeLuxe ELECTRIC FURNACES**

Here's a series of compact, built-in Huppert temperature durable furnaces that are ideal for tool and die shops and small laboratories. Any desired temperature within the range of 300° to 1900° F. is controlled by an accurate, built-in Huppert temperature controller. All-steel construction—multi-insulation—sturdy Kanthal elements—counterweighted doors—removable porcelain tray.

Model No.	Inside Dimensions			Temp. Range	Watts 110 Volts AC	Price
	Wide	High	Deep			
434DL	4 1/4"	3 3/4"	4 3/4"	300°-1600° F.	920	\$ 86.00
439DL	4 1/4"	3 3/4"	9"	300°-1600° F.	1650	115.00
436DL	4 3/4"	3 3/4"	6"	300°-1900° F.	1650	115.00
5DL	4 3/4"	3 3/4"	9"	300°-1900° F.	1750	176.00
9DL	6"	6"	6"	300°-1900° F.	2200	200.00
669DL	6"	6"	9"	300°-1900° F.	3000	248.00
10DL	8"	4"	6"	300°-1900° F.	2000	220.00
849DL	8"	4"	9"	300°-1900° F.	3000	265.00

Available for 220 Volt AC at small additional cost.
Stainless steel housing slightly higher.

K. H. HUPPERT CO.

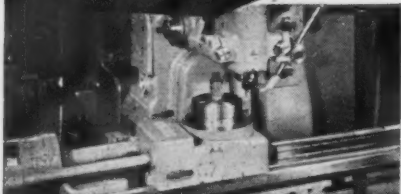
6841 COTTAGE GROVE AVENUE,

CHICAGO 37, ILLINOIS

Manufacturers of Electric Furnaces and Ovens

For more data circle 429 on Reader Service Card

How To Increase Production And Improve Accuracy



With a **SUNDSTRAND** Automatic Index Base

In many cases, the addition of this Automatic Index Base has increased milling production enough to eliminate need for the purchase of additional machinery. It may be the answer to your milling production requirements. Call in a Sundstrand engineer. There is no obligation for this service.

**Accurate
Spacing,
Powerful
Clamping
Insures
Accuracy**



Sundstrand
Automatic Index Base

This automatic index base is designed so there is no strain against the index plunger during the cut. The base is locked by powerful clamping so that accuracy of index is not affected by heavy cuts.

Get Complete Data Free

This 8 page booklet contains production figures and specifications. Send for your copy today. Ask for bulletin 570



SUNDSTRAND MACHINE TOOL CO.
2539 Eleventh Street, Rockford, Ill., U.S.A.

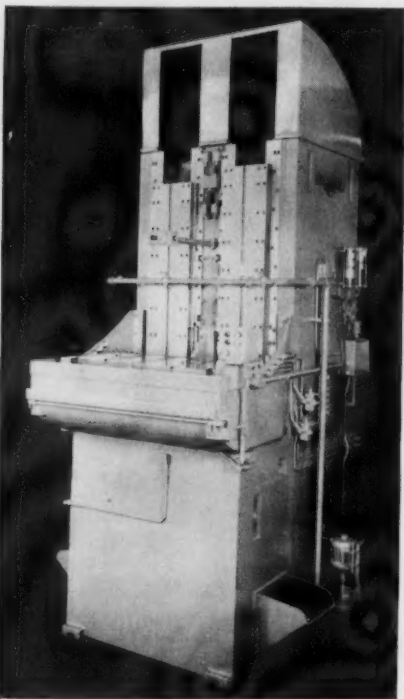
For more data circle 430 on Reader Service Card

264 modern machine shop

new shop equipment . . .

rial. Ram ways are pressure lubricated and all gears are automatically lubricated. Hydraulic power is provided to operate the workholding fixtures, and is interlocked with the machine cycle. All hydraulic and electrical controls on the Colonial broaching machines are interlocked and installed in accordance with J.I.C. standards. Tables and fixtures of the machine are hydraulically actuated.

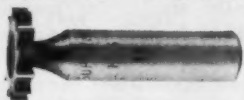
For more data circle 96 on Reader Service Card



View of Colonial 15-Ton Capacity ElectroGear
Dual Ram Vertical Broaching Machine

July, 1956

WOODRUFF KEYSEAT CUTTERS



- The best high speed steel for increasing production on tough jobs.
- Standard sizes in stock and shipped same day order received.
- Prompt service on specials made to your print or sketch.
- Discounts for quantity users.
- Long experience in the exclusive manufacture of Keyseat Cutters.
- For quotations and prices write . . .

SUPREME KEYSEAT CUTTERS CO.



1328 Forty-Third Street
Kenosha, Wisconsin
OL 4-8800

Some Territories Available

For more data circle 431 on Reader Service Card

New **KNURLMASTER** Hand Knurler

\$13.50



No distortion —
even on 1/8" stock!
MODEL "C"

For small production runs on 1/8" to 1" stock. Exclusive screw design gives perfect knurl pattern. Furnished with 3 hardened knurls of standard 1/2" dia. Forged steel frame is self-centering. Write for illustrated folder.

Dealers Inquiries Invited

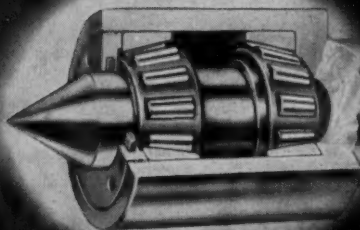
ROCKWIN MANUFACTURING CO.

• 80-D Magnolia St., Westbury, L. I., N. Y. •

For more data circle 432 on Reader Service Card

... heavy loads at high speeds

Falls **ROTO CENTER**



for
lathe and grinder
tail stocks

Accurate, low cost turning on tough continuous-run work. Preloaded, matched roller bearings assure rigid set-up. Precision ground shank. Heavy-duty grease seal. Many exclusive features.



FALLS PRODUCTS, INC., 124 Genoa Street, GENOA, ILL., U.S.A.

For more data circle 433 on Reader Service Card

new shop equipment . . .

**PNEUMATIC SLIDE FEED
FOR SMALL PUNCH PRESSES**

Designated as the Model M-256, a newly designed, smaller air-operated slide feed with open throat for fast, automatic feeding on small punch presses has been announced by Cooper Weymouth, Inc., 277 Noble Ave.,

Bridgeport 8, Conn. Because of its small size and light weight, it can be easily moved from press to press or may be left mounted on die sets and conveniently stored for frequent re-orders. This feed is not a spring-fed feed and no cam cut-outs are necessary for its operation.

The unit operates on shop air lines with 50 to 100 p.s.i. and takes material up to a maximum thickness of 1/16 inch and to maximum widths of 6

inches in lighter gauges. This pneumatic slide feed has a maximum feed length of 3 inches, operating at 200 strokes per minute and will feed at correspondingly higher speeds when shorter feed lengths are used.

Simple to set up and extremely accurate in operation, only one screw adjustment is necessary. While it operates off the press crankshaft, the length of the press stroke does not affect the feed length. Other advantages of particular interest are a feed finger that has a larger stock gripping surface than many larger mechanical feeds and yet leaves the material unmarked, cushioned stops, roller stock guides and a

**IF YOU DO
HIGH SPEED MILLING**

**You'll Need
This Helpful
NEW
Catalog!**

**GIVES ALL THE
FACTS ON MILLING
WITH CURVED TOOTH
CUTTERS**



- Complete information on curved tooth milling cutters. How they increase production, save time, extend tool life and eliminate chatter.
- Gives the complete line of Aber Curved Tooth Milling Cutters.
- Helps you select the proper cutter for the job. Comprehensive charts and simple ordering data.
- Contains data sheet on how to sharpen curved tooth milling cutters . . . other helpful information.

**ABER ENGINEERING
WORKS**

WATERFORD, WISCONSIN

Write for
FREE Copy Today

For more data circle 434 on Reader Service Card

HARGRAVE CLAMPS

A Complete Line of Clamps for all Purposes

Individually
Power Tested
for Better
Performance



1/2" C", Steel Bar,
Quick Acting,
Wood Hand
Screws, Welders

WRITE FOR FREE CATALOG.

Showing Clamps, Chisels, Punches, Masonry Drills
for hand and power hammers, Carbide Drills,
Washer Cutters, and File Cleaners.

Stocked by Your Local Distributor.

THE CINCINNATI TOOL COMPANY

1947 Waverly Ave., Cincinnati 12, Ohio

For more data circle 435 on Reader Service Card

PREWO PRECISION MACHINE VISES



• UNDERDRAW CONSTRUCTION

No Lifting of Jaws
Faster Clamping
Workpiece Held More Securely

• HIGHER ACCURACY

Various Types: For Milling
and Drilling Machines; also
Quick Clamping Vise
With and Without Swivel
Highest Precision Toolmakers'
Universal Vises also available

**NEISE
MODERNTOOLS**

KARL A. NEISE
404 4th Ave., Dept. MMS,
New York 16, N. Y.

For more data circle 437 on Reader Service Card

CAMS

MADE TO YOUR SPECIFICATIONS

—Except Screw Machine Cams—

Design Assistance Offered

KIDDE PRECISION TOOL CORP.

15 LOCUST AVENUE, ROSELAND, N. J.

For more data circle 436 on Reader Service Card

PRODUCTION TOOLS

by **APEX**



APEX

engineered
and manufac-
tured the original
adjustable, shank-
less, serrated tool.

MULTIPLE

MILLING CUTTER

This combination tool, with
super cobalt, adjustable, serrated
blades, incorporates boring and
facing into a single operation.
One of many economy tools in
the Apex line. Send for catalog.
Service engineers will gladly co-
operate with you on tooling.

Apex
FOR
INSERTED

Catalog on Request

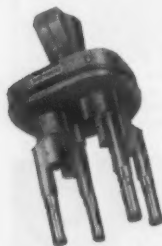
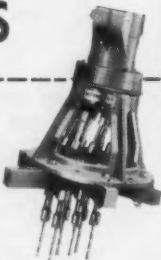
THE APEX TOOL & CUTTER CO., SHELTON 15, CONN.

For more data circle 438 on Reader Service Card

THRIFTMASTER...

your source for dependable DRILLHEADS

Universal Joint Type Drillhead . . . Full Ball or Bronze Bearing Construction, Standard or Heavy Duty. From $\frac{1}{2}$ " minimum centers up. Capacities to $\frac{1}{2}$ " in Steel.



Single and Double Eccentric Type Adjustable Drillhead . . . Enclosed, Full Ball Bearing Construction. *New Double Eccentric Type illustrated.*



Special Fixed Center Drillhead . . . Made to your requirements. Full Ball Bearing Construction.

- ★ We stock or can build the *right* drillhead for your jobs.
- ★ Write for your free copy of the THRIFTMASTER CATALOG or phone for a rush, on-the-spot quote.



Subsidiary of
Thomson Industries, Inc.

1034 N. PLUM STREET
LANCASTER, PA.

Also Makers of

DORMAN AUTOMATIC REVERSE TAPPERS

For more data circle 439 on Reader Service Card

268 modern machine shop

new shop equipment . . .

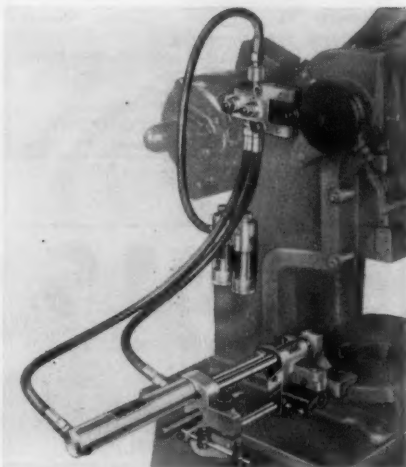


Illustration showing Cooper Weymouth Model M-256 Pneumatic Slide Feed

unique locking action of the rear gripping unit that prevents over riding and buckling of the stock.

For more data circle 97 on Reader Service Card

★ ★ ★

EXTRA-SAFE 15-TON DEEP-THROAT PUNCH PRESS

Kenco Manufacturing Co., 5211-A Telegraph Rd., Los Angeles 22, Calif., now offers a 15-ton deep-throat punch press with the same unprecedented safety and mechanical advantages recently introduced in the Kenco 15-ton Electro-Safe standard model. Because the deep-throat Electro-Safe has no flywheel, there are no stored-energy and double-tripping hazards. Mechanical clutching has also been eliminated. Consequently, noise, vibration and accidents normally connected with clutching cannot occur. The stroke results from an electrical surge, which

July, 1956

BRONZE BUSHINGS:

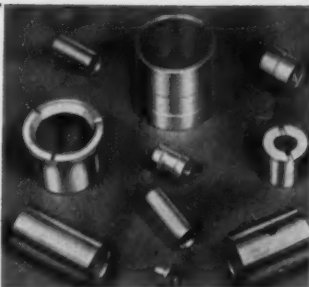
- For the most exacting requirements
- Made by skilled craftsmen
- Quality controlled by chemical and physical laboratory tests
- Machined on special, advanced design, high production equipment
- Shipped on an emergency basis when you need them

LEADING SUPPLIER TO LEADING USERS

Superior

BRASS WORKS, INC.

314 South Crawford Street
Detroit 17, Mich., VI 1-4322



For more data circle 440 on Reader Service Card



for nut countersinking

Two KENT machines are available—the smaller for nuts up to $\frac{3}{4}$ " hexagon—the larger for nuts up to $1\frac{1}{4}$ " hexagon.

Hopper fed. Duplicate work spindles countersink both sides of nuts simultaneously giving fast, economical production.

Write for bulletin.

The KENT MACHINE COMPANY

Cuyahoga Falls, O.

Drillers - Threaders - Slotters - Countersinkers - Bar Pointers

For more data circle 441 on Reader Service Card

**SHALLOW HOLES...DEEP HOLES
DRILL THEM *FASTER,*
ALL *BETTER***

WITH A
Commander

DRILL CHIP BREAKER

- ✓ Small Chips Permit 50%—400% Increase in Drilling Speeds
- ✓ Drill 10 Diameters or More in Depth Without Clearing Drill
- ✓ Better, Smoother, More Accurate Holes

Reciprocating action of the Commander Drill Chip Breaker breaks chips into small pieces that travel up drill flutes . . . permitting higher drilling speeds . . . doubles and triples production of shallow OR deep holes. Long chips which cause drill breakage, scored holes, slow jig and fixture loading, are eliminated—small, easy to handle chips flow up out of hole continuously, permitting coolant to reach cutting edge of drill. Assures longer drill life, more holes per sharpening, more holes per hour. Your nearby COMMANDER Distributor has the Drill Chip Breaker and other Commander Production Tools.



Ordinary Chips



Chip Breaker Chips

Commander MFG. CO.

4224 W. KINZIE STREET • CHICAGO 24, ILLINOIS

Write FOR
CATALOG #851

which describes Commander's
Production Tools

For more data circle 442 on Reader Service Card

new shop equipment . . .

starts the motor from a dead stop. Motor goes dead again at the end of the stroke cycle. With no clutch and flywheel, the trouble and expense caused by breakdown of those parts is said to be eliminated.

Two single-trip buttons are widely

spaced to keep the operator's hands clear of the danger zone. He must push both buttons at once, hold them until stroke reaches bottom, then release both buttons to start a new cycle. A heavy-duty safety brake applies whenever power is disrupted or disconnected, and a safety stop button halts the press instantaneously at any point in the cycle.

Versatile controls permit the operator to change from "single trip" to "continuous stroke," "inching," or two-hand or foot control by merely turning a dial. This selector switch can be locked in position by authorized personnel, so that the operator cannot expose himself to danger by varying the setting. Timing can be changed in seconds by resetting a cam. The press offers single-trip speeds up to 60 strokes per minute, and continuous operation speeds of 190 strokes per minute. Fewer or more strokes may be obtained for special work.

The extremely rigid, multiple-rib frame is a sorbo-mat casting, offering exceptional strength. Despite the 15-inch throat,

For VERSATILITY IN THE SHOP — ON THE JOB

cut it with the

**WELLS
49-A**

Here's real versatility in a Metal Cutting Bandsaw. The Wells 49-A is a dual purpose machine designed for shop or "job-site" work—economical to buy—economical to operate. Has 3" pipe capacity.

Use it as a horizontal cut-off saw to handle conduit cutting, bar stock or odd shapes. Swing the head into vertical position and the 49-A converts to an upright bandsaw for cutting angles, slots, notches, bevels and contour work.

The $\frac{1}{2}$ " blade is powered by a $\frac{1}{4}$ H.P. motor—other features include three selective speeds, positive vise action and automatic shut-off after each cut.

Ask your Wells Distributor for full information or write direct.



As a Vertical Bandsaw



For Horizontal Cut-off



The Pioneers of Horizontal

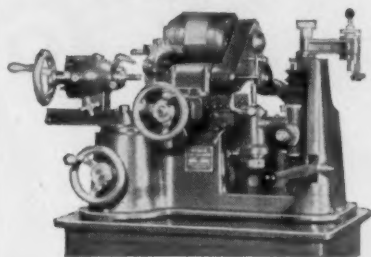
**METAL CUTTING
BAND SAWS**

WELLS MANUFACTURING CORPORATION
808 TYLER ST. • THREE RIVERS, MICH.

For more data circle 443 on Reader Service Card

HYBCO TAP GRINDER

Sharpens Chamfers, Flutes
and Spiral Points



MODEL 1100

- Capacities No. 0 Machine Screw to 1 1/2" Hand Taps.

HENRY P. BOGGIS & CO.

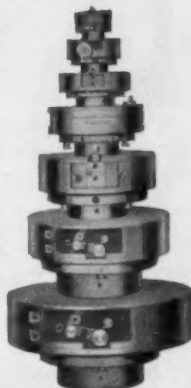
708 E. 163rd St., Cleveland 10, Ohio

For more data circle 444 on Reader Service Card

MUMMERT-DIXON FACINGHEADS

Two-way tool feed
in 9, 12, 16, 20, 24,
30, 36, 40 and 46
sizes.

One-way tool feed
in 6, 9 and 12 sizes.
Automatic feed —
convenient tool ad-
justment — quick
feed reverse. Save
time and costly set-
ups.



Write for
folder.

MUMMERT-DIXON CO.

120 PHILADELPHIA ST. • HANOVER, PA.

For more data circle 445 on Reader Service Card

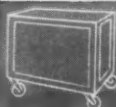
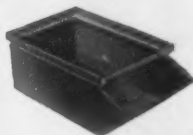
HOW ARE YOU FIXED FOR BOXES?

Finding a place for production parts can
be inconvenient and time consuming when
boxes are unavailable.



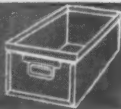
For the best steel
stacking box, its Ster-
ling—its top rim con-
struction makes it
best.
Sterling makes all
types and sizes of
steel boxes.

**STERLING
FACTORY EQUIP. CO.**
183 Charles St.,
Providence, R. I.

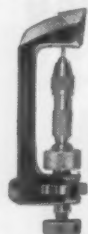


Sterling

Quality Handling & Storage Equipment



For more data circle 446 on Reader Service Card



TRUE POINT DRILL SHARPENER

for Drills 41 - 60 and
61 - 80 R.H. & L.H.

A properly sharpened drill cuts
faster — more accurately and is
less likely to break.

Write for circular and
full details.

UP-TO-DATE TOOL CO.

P. O. Box 99, Station A, Worcester 8, Mass.

For more data circle 447 on Reader Service Card

Sell your TUNGSTEN CARBIDE SCRAP

Advise Quantity. Highest Prices Paid.

THE SHWAYDER COMPANY

DEPARTMENT 1B

684 E. Woodbridge Detroit 26, Michigan
Wo. 1-4946

For more data circle 448 on Reader Service Card



Specifications
Table Movement:
6" x 10"
Table Size:
7" x 17 1/2"

LINLEY BROTHERS CO.

661 State St. Ext.,
BRIDGEPORT 1, CONN.

Handle your small
part precision
JIG BORING
on the
LINLEY
JIG BORER

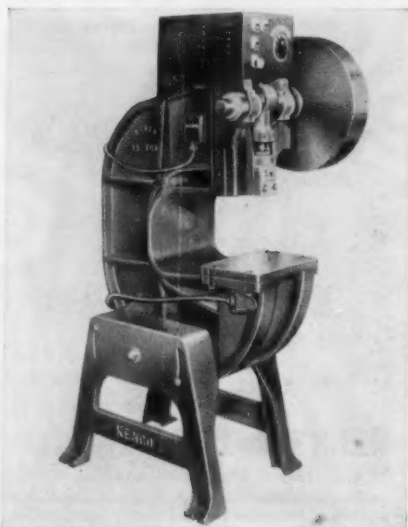
Why tie up your big,
costly jig borers on small
work when you can get
maximum utility at less
cost per hour on a ma-
chine exactly fitted to
your work. Put your small
work on the LINLEY
where it belongs and
reserve your large ma-
chines for large work,
where large work be-
longs. You'll save money
this way.

Complete details sent
promptly on request

For more data circle 449 on Reader Service Card

272 modern machine shop

new shop equipment . . .



Kenco Extra-Safe Deep-Throat Punch Press

deflection when punching at full ca-
pacity is negligible. The press is solid
backed and inclinable.

For more data circle 98 on Reader Service Card

★ ★ ★

SECTIONAL IMPREGNATED ABRASIVE BUFFS FOR FERROUS AND NON-FERROUS METALS

A sectional impregnated abrasive
buff, for the buffing of all ferrous and
non-ferrous metals, has been developed
by the Coated Abrasives Division of
The Carborundum Co., Niagara Falls,
N. Y. Engineered of specially-treated
biased cloth, impregnated with select-
ed abrasive grains bonded throughout
its entire construction, the sectional
impregnated abrasive buff is available
in fine and coarse grit sizes.

For more data circle 99 on Reader Service Card

July, 1956

**Write for new catalogue
of Carbide and High Speed
Rotary Files and Burrs.**

**Save Dollars By Using
Our Re-Sharpening Service**



ROTARY FILE COMPANY

400 E. Slauson Ave.
Los Angeles 11, Calif.

For more data circle 450 on Reader Service Card

HIGH SPEED DRILLS

FLAT TWISTED AND ROLLED SECTION

**Unexcelled in
Quality and Performance!**

• SINCE
1903

HI-DUTY Flat-Twisted and Rolled Section Drills are produced by forging and hot twisting bars of high speed steel. This method improves the structure by preserving the grain of the steel. Sizes range from 1/8" to 3 1/4" and larger. Milled type drills are also available—from 1/64" to 1/2" diameter. HI-Duty means long-lasting economical service!

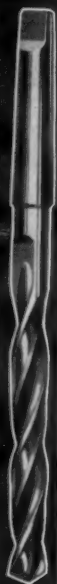
SPECIAL DRILLS

We manufacture a large variety of special types of high speed drills—special diameters and lengths; also step drills.

FAST DELIVERY . . .

We can make immediate shipment from stock on many special drills! Contact your Industrial Supplier . . . or write today for Catalog and Price List.

HI-DUTY DRILL WORKS
FLEETWOOD, PENNSYLVANIA



For more data circle 451 on Reader Service Card



**STERLING
Model "DV"
Variable Angle
DRILL GRINDER**

ONE Drill Grinder Sharpens ALL Drills

- 90° to 140° Included Angle
- 1/8" to 2 1/2" Diameter
- 2-3-4 Flutes
- Without Chucks or Collets

Write for complete
information on the **STERLING
Model "DV" Drill Grinder**

McDONOUGH MFG. CO.

1521 GALLOWAY • EAU CLAIRE, WISCONSIN

For more data circle 452 on Reader Service Card

new shop equipment . . .

POSITIONING TABLE DESIGNED FOR PRODUCTION DRILLING OPERATIONS

A new type of positioning table, for production drilling operations, has been developed by Howe & Fant, Inc., East Norwalk, Conn. This table will reproduce any pattern of holes within its capacity. It is simple in design, economical, fast acting, consistently accurate within 0.001 inch and easily changed from job to job. Available in various sizes to meet a wide range of work requirements, the table may be mounted on any drilling machine, but is particularly valuable when used in conjunction with the Howe and Fant turret drilling and tapping machine, which has six spindles, all of which operate on the same axis.



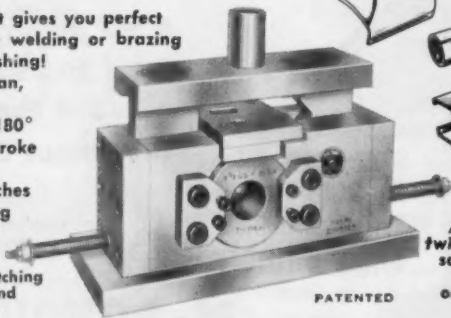
View of Howe and Fant Positioning Table

The table consists essentially of a movable portion which rides freely over a predetermined area on ball thrust bearings; a removable hole location plate which carries the particular hole pattern to be reproduced; an air-actuated locking mechanism which aligns the table with the machine spindle for each operation; and a fixed base which is fastened securely to the ma-

the **ARC-TWIN** *Cuts Two Perfect Notches* in One Downstroke of Press!

SAVING both time and cost, it gives you perfect T-joints — instantly ready for welding or brazing without deformation or finishing! Twin-acting punch shears clean, from inside out, leaving two matching notches (in perfect 180° alignment) with every downstroke of the punch press. Quickly interchangeable dies and punches accommodate pipe and tubing from ½" to 2½" O.D.; special units, up to 3" O.D.

Special Arc-Twins for double notching stainless steel or monel metal and units built to your specifications can also be furnished.



Ask for
twin-notched
sample of
pipe
or tubing

PATENTED

VOGEL

TOOL AND DIE CORPORATION

1823 North 32nd Avenue
Melrose Park, Illinois

For more data circle 453 on Reader Service Card



Executive head of large plastics firm

"My firm saves \$27,000 annually with specially designed ESSEX carbide burrs."

"Before we switched to ESSEX tools, we spent \$45,000 yearly for high speed burrs. ESSEX carbide burrs, made to our specific needs, cost us only \$18,000—an annual saving of \$27,000!"

Find out how ESSEX carbide tools can help you. Write for free, 12-page illustrated catalog today.

ESSEX ROTARY FILE & TOOL CORP.
295 MADISON AVE., N. Y. C. 17

My name _____ MMS-76

Company _____

Address _____

City _____ Zone _____ State _____

For more data circle 454 on Reader Service Card



CONTINUOUS HINGES

Manufactured by

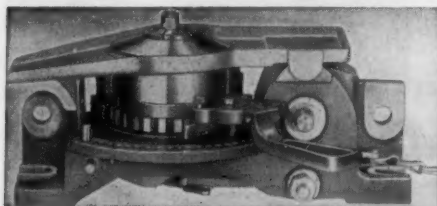
**AUTO MOULDING
& MFG. CO.**

WRITE FOR CATALOG

1114 E. 87TH ST.

CHICAGO 19

For more data circle 455 on Reader Service Card



DEARBORN Automatic Chucking and Indexing Fixture

FEATURES:

1. Work held by collets
2. Automatic opening and closing
3. Work automatically ejected
4. Automatic indexing if required
5. Three models with capacities from 1/32" to 2".

J. W. DEARBORN
ANSONIA • CONN.

Write for illustrated data. Send blue-prints or specifications of work.

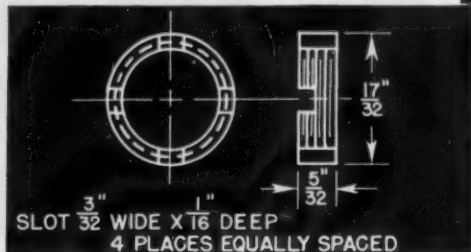


For more data circle 456 on Reader Service Card

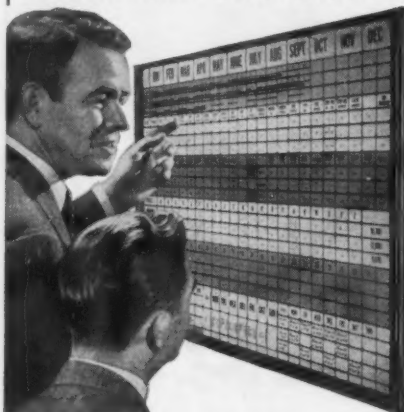
modern machine shop 275

1200 PIECES PER HOUR

This piece was made from brass rod and slotted as shown in the print below. Production on this item was 1,200 pieces per hour.



You Get Things Done With Boardmaster Visual Control



- ☆ Gives Graphic Picture of Your Operations — Spotlighted by Color
- ☆ Facts at a glance—Saves Time, Saves Money, Prevents Errors
- ☆ Simple to operate — Type or Write on Cards, Snap in Grooves
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- ☆ Made of Metal. Compact and Attractive. Over 60,000 in Use.

Complete price **\$49.50** including cards

FREE

24-PAGE BOOKLET No. MS-30
Without Obligation

Write for Your Copy Today

GRAPHIC SYSTEMS

55 West 42nd Street • New York 36, N. Y.

For more data circle 457 on Reader Service Card

276 modern machine shop

new shop equipment . . .

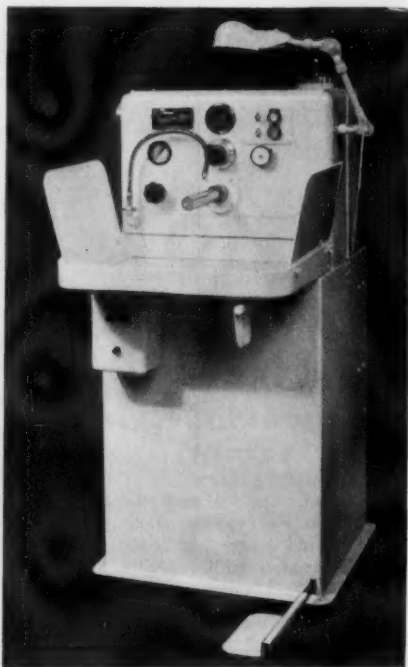
chine table. To move from one hole center to another, the operator simply depresses a lever and slides the movable portion of the table to the approximate hole center for the next operation. At this point, the locking mechanism automatically pulls the table into correct alignment and holds it there until the cutting operation is completed.

For more data circle 100 on Reader Service Card

★ ★ ★

COMPLETE HYDRAULIC SYSTEM

A completely hydraulic system, which is said to assure constant press-



View of Superior Model H. M. Honemaster

July, 1956

PRECISION PINS

Dowel — Straight
Countersunk — Taper
Made to Blueprint
CENTERLESS GROUND
TO $\pm .0001$ " ACCURACY
.030" to .125" Diam.
.125" to 2." Length
Complete Centerless Service
Since 1931

COMMERCIAL
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6605 CEDAR AVE. Phone EN 1-3412 CLEVELAND 3, O.

For more data circle 458 on Reader Service Card



SAVE SET-UP TIME WITH

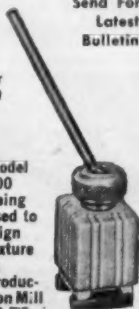
MODEL NO. 100
MAGNETIC BASE DIAL
INDICATOR HOLDER

- ✓ Magnetic Pull 65 lbs.
- ✓ Includes swivel adaptor permitting 360° adjustment in all directions.

Send For
Latest
Bulletin



Model
100
Being
used to
align
Fixture
in
Production Mill



ENCO Manufacturing Co., Dept. 176
4524 W. Fullerton Ave., Chicago 39, Ill.

For more data circle 459 on Reader Service Card

STUDY....
these outstanding
features of the
New
CHESTERMAN
Vernier
Height Gage

The Most significant advance
in a quarter Century of
HEIGHT GAGE DESIGN

Sizes Available: 12" - 18" - 24" - 40" - 48"

Ask for and Compare our Moderate Prices!
If not available at your favorite Supply House —
Write to us for 6-Page
ILLUSTRATED FOLDER—Code GIPDU

GEORGE SCHERR CO., Inc.

200-MM LAFAYETTE ST. • N.Y. 12, N.Y.

EASY
READING
2-1/2"
LONG
VERNIER

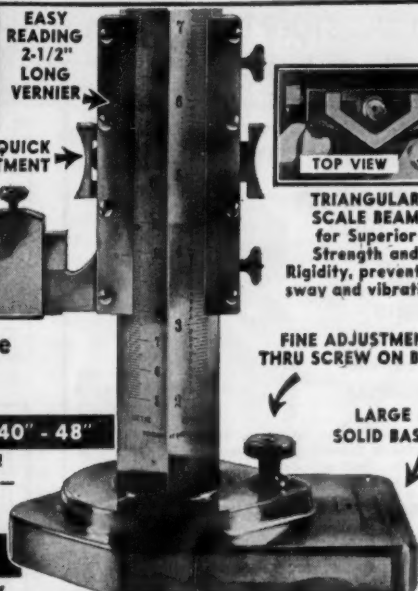
RAPID QUICK
ADJUSTMENT



TRIANGULAR
SCALE BEAM
for Superior
Strength and
Rigidity, preventing
sway and vibration.

FINE ADJUSTMENT
THRU SCREW ON BASE

LARGE
SOLID BASE



For more data circle 460 on Reader Service Card

new shop equipment . . .

ure, is one of the features of the Model H. M. Honemaster, introduced by Superior Hone Corp., 1615 Elreno St., Elkhart, Ind. Stone pressure control is adjustable to the diameter of the piece and material being honed. Stone wear



MASTER GRIPPING CLAWS System Hubner

WHY use them?

1. Clamping action Vertical as well as Horizontal—pressing workpiece down directly on

the machine table. No hammering and still no air between. 2. Gain more working room. 3. Faster and more secure setups. Easier to handle. 4. Unlimited jaw opening. 5. No straps overlapping on the workpiece; more machining surface. 6. Extremely versatile—take light cuts or heavy cuts, use on small machines or heaviest production machines.

Exclusive Agents

KARL A. NEISE
404 4th Ave., Dept. MMS,
New York 16, N. Y.

NEISE
MODERN TOOLS

For more data circle 461 on Reader Service Card

CUTTING STOCK DIAMETERS UP TO 40 INCHES?

USE

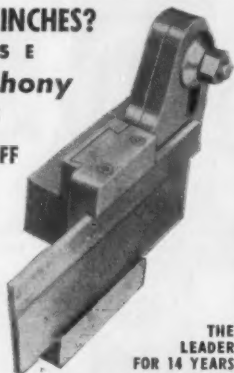
Skee-Anthony

(PATENTED)

CUTTING OFF
TOOLS

for . . .

- ★ BORING MILLS
- ★ LATHES
- ★ PLANERS
- ★ SHAPERS



THE
LEADER
FOR 14 YEARS

Patented Pivoting Trunnion, Safety-Slip and Support Blade prevent blade breakage and injury to operator. Fast adjustment to lathe center.

Write for free descriptive folder A-1

-SKEE TOOL COMPANY
1406 N. FLORES ST.
SAN ANTONIO, TEXAS

• Few Industrial Areas Open for Representatives •

For more data circle 462 on Reader Service Card

278 modern machine shop

or stock removal causes no fall off of pressure. Constant cutting action is said to be assured. The hydraulic system also operates the clutch and brake mechanism.

The single control sizing dial indicator is set by honing the first piece to finish size. Thereafter, it is only necessary to compensate for stone wear. This sizing dial indicates when the piece is coming to size.

Infinitely variable spindle speed, 100 to 900 r.p.m., provides for the right speed for work of any diameter, material or finish. There is an easy to read tachometer. The spindle, with hardened pilot bushing mounted on factory sealed bearings, requires no lubrication attention.

The hydraulic oil and coolant oil is self-contained in one divided steel fabricated tank. The hydraulic section has an easily accessible filler plug, and the hydraulic suction line includes a filter unit. The coolant section has baffle plates, as well as an easily accessible strainer basket mounted on the top of the cover.

The machine can be operated from either the foot pedal while standing, or from the knee pedal while sitting.

For more data circle 101 on Reader Service Card

CENTERLESS GRINDING

Brown & Sharpe and Swiss Automatic screw machine parts, aircraft and standard, heat treated and ground if necessary. Send blue prints for estimates. 27 years serving industry. The Porter Machine Co., Cincinnati 9, Ohio.

For more data circle 463 on Reader Service Card

WARNER

CLUTCHES
BRAKES
& PARTS

SHIPPED FROM STOCK

WOOD-COMPTON CO.

25010 LAKELAND BLVD., CLEVELAND 32, O.

For more data circle 464 on Reader Service Card

July, 1956

READING BENCH KEYSEATER

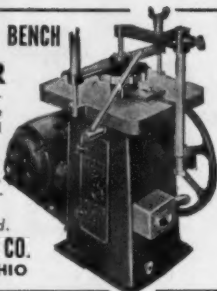
Portable—move directly to job; a time saver for both small and large shops.

3 3/4" stroke; adaptable for other work.

Low first cost—prompt delivery.

Good dealers wanted.

READING MACHINE CO.
CINCINNATI 37, OHIO



For more data circle 465 on Reader Service Card

JIG BORING

and

Large Precision Machining

Done to your specifications

We Have 21 Jig Borers

KIDDE PRECISION TOOL CORP.

15 LOCUST AVENUE, ROSELAND, N. J.

For more data circle 466 on Reader Service Card

SHARP NAMEPLATE MARKING

Model
No. 4



The nameplate on your product is your signature. Keep it neat and legible! Accurate location and alignment are assured with this

**NAMEPLATE
DETAIL PRESS.**

- Simple Operation
- Perfect Alignment
- Uniform Depth

GEO. T. SCHMIDT, INC.



1806 W. BELLE PLAINE AVE.
CHICAGO • 13 • ILLINOIS

For more data circle 467 on Reader Service Card

The ONLY Live Center On Which Points May Be Interchanged to $\pm .0001$

Points Must Be
Ordered With
LIVE CENTER
To Achieve This
Degree Of
Accuracy.



Ask your local distributor or write direct for 26-page Catalog on Live Centers, Collets, Internal Collets, Draw Bars, and Turret Tool Posts.



ROYAL PRODUCTS, 84 Union Street, Mineola, L. I., N. Y. Pioneer 6-4245

For more data circle 468 on Reader Service Card

Empire Live Centers

Quality engineered for use on lathes, grinders, and milling machines . . . Empire Live Centers are versatile, accurate, heavy duty. Tapered seats give consistent precision alignment . . . assure accuracy of .0001. Positive seal eliminates dirt, grit, cutting oils. Combination bearings absorb both radial and thrust loads.



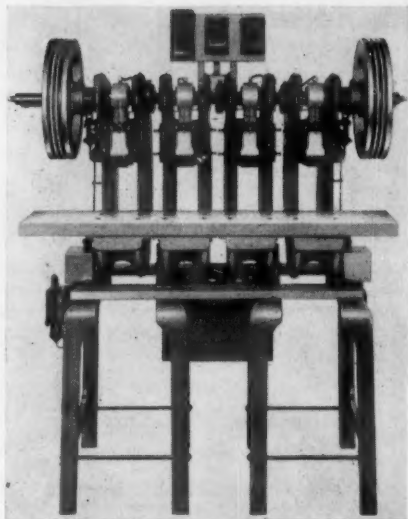
Manufactured in all tapers: Morse, Brown & Sharpe, Jarno, and straight shank. Special shanks and points to order.

Empire Toolmaker's Set available in handrubbed American Walnut case.

new shop equipment . . .

**MULTIPLE RAM PRESS PROVIDES
LARGE BED AREA ECONOMICALLY**

Benchmaster Manufacturing Co.,
1835 W. Rosecrans Ave., Gardena,
Calif., is producing a new series of
multiple ram presses, especially engi-
neered to supply a large bed area for



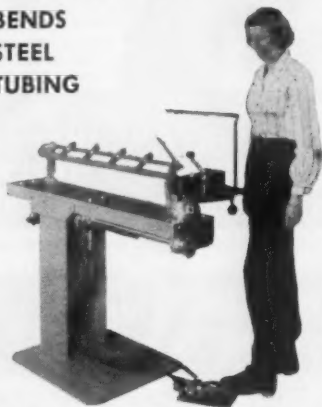
View of Benchmaster Multiple Ram Press

multiple die operations where only moderate tonnage is required per die stage. Remarkable versatility results, since any required number of rams can be supplied in tandem, each ram performing one operation in a progressive setup. The multiple ram press is claimed to eliminate use of much higher tonnage presses to obtain necessary bed area, reduce capital investments and also lower tooling hazards and maintenance.

On progressive die jobs, dies are

CURVIT 105

**BENDS
STEEL
TUBING**



**EASIER
SIMPLER
FASTER**

480 bends an hour. Four dif-
ferent bends without removing
tube from machine.

KILHAM ENGINEERING INC.

BOX 208, NORTH ATTLEBORO, MASS.
MYrtle 5-6211

CURVIT 105

For more data circle 469 on Reader Service Card

280 modern machine shop

BREMIL
The IMPROVED Compound Lever Shears

**ALL ALLOY
FULLY
GUARANTEED**

Two Sizes

PORTABLE

No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to 1/4" steel plate.

BREMIL MFG. CO.
1020 Holland St., Erie, Pa.

For more data circle 470 on Reader Service Card

July, 1956



Make 3 hammers AT ONCE!

It's the NEW, easy, economical, quick way to mold your own lead hammers on a production basis with "SHUR-GRIP" handles and this COOK production mold.

Write for circular and prices
LAWRENCE H. COOK, INC.

67 MASSASOIT AVENUE, EAST PROVIDENCE 14, R. I.



For more data circle 471 on Reader Service Card

Low Cost Automatic HORIZONTAL STOCK REEL

Self-powered

24" \$85.00
dia.

30" \$90.00

36" \$95.00

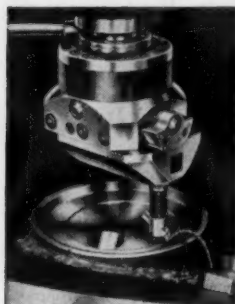
Write for details



JACO DEVICES, INC.

98 High St., Hingham, Mass.

For more data circle 472 on Reader Service Card



REASONS WHY MODERN ENGINEERS SELECT The Wohlhaupter MASTERHEAD

For Precision Work & Most Economical & Automatic Operation

- The MASTERHEAD does Boring, Facing, Recessing, Undercutting, Outside Turning, etc.
- It does this in One Operation and on One Machine.
- Automatic Feeds. • Automatic End Release.
- Increases the capacity of your present equipment.
- Increases Production, makes Better Finished Work.
- Nine Models available for work up to 36 1/4" diameter.

Also taper cutting heads.

Send for illustrated literature

Sole Agent

**KARL A. NEISE, 404 Fourth Ave., Dept. MMS,
New York 16, N. Y.**

**NEISE
MODERNTOOLS**

For more data circle 473 on Reader Service Card

How SQUARE HOLED SLEEVES SPEED UP TOOL-MAKING!

One of the most difficult problems in tool making can be solved easily and quickly with Sturdy Square Holed Sleeves. The perfection of broached square holes can be had in boring bars, milling cutters and many other applications at a small fraction of the cost of imperfect hand-made square holes. The Sturdy Square Holed Sleeve consists of a round sleeve with a perfectly square hole broached through the center. This hole is tapped at one end to receive a back-up screw which is furnished with the Sleeve. The Sleeve can be sweated or pressed into a drilled and reamed hole to make a perfectly square accurate hole in a very few minutes.

The Sturdy Square Holed Sleeve will save you many hours and many dollars in the making of boring bars, tool holders and other tools requiring square holes.

SLEEVES MADE IN FOLLOWING SIZES:

3-16, 1-4, 5-16, 3-8, 7-16, 1-2, 5-8, 3-4, 1"

STURDY BROACHING SERVICE, INC.

23516 TELEGRAPH ROAD

DETROIT 19, MICH.



Patents Pending

Write for
Literature

For more data circle 474 on Reader Service Card

*When You Can't
Turn the Tap
Wrench for
Lack of Space...*



**WALTON
TAP
EXTENSIONS
QUICKLY
PROVIDE
NEEDED
LENGTH**

Walton Tap Extensions are a quick solution to this troublesome problem — where it is difficult or impossible, because of limited space, to turn a tap wrench.

Fit all standard hand taps (4-flute, 3-flute, and 2-flute styles) from #10 (3/16") to 1" inclusive. They are made of special alloy steel, heat-treated, with square openings cold drawn to conform to size.

Send for descriptive bulletin and price list #10, listing these and other Walton Specialized Tools: Tap Extractors, "Rops" Pipe and Stud Extractors, and "Walton-American" Tool Holders. All tools offered for a 30 day FREE TRIAL.



**The WALTON Company
HARTFORD 10, CONN.**

For more data circle 475 on Reader Service Card

new shop equipment . . .

made in separate stages, each stage operating on its own ram. Where frequent sharpening is required or where dies are subject to breakage hazards, duplicate dies are kept on hand for immediate replacement, making possible almost continuous press time and lowering risks of damage to balance of the components. All Benchmasters in the tandem unit operate on a single common crankshaft. Strokes can be furnished of uniform lengths, or each stroke can vary to suit requirements, thus accommodating shearing, piercing, bending, forming, and so on, in the same line with maximum efficiency. Ram travel is always synchronous—rams descend simultaneously, alternately or at staggered intervals, depending on crankshaft design. If slower strokes are needed, the gang is furnished back-geared. The press illustrated, with electrical clutch control, permits single tripping to check each setup stage or can be run continuously with individual electrical switch buttons. A safety control button simultaneously stops motors and rams. One shot lubrication automatically reaches all wear points of all presses.

The multiple ram press can be supplied with any frame spacing for intermediate operations of any nature, and with 2, 5 or 8 ton units, plain or backgeared. All members of the tandem, however, must be of the same tonnage rating.

For more data circle 102 on Reader Service Card

★ ★ ★

TRAVELING WHEEL FACE GRINDER IS DESIGNED FOR GREATER PRODUCTION

Mattison Machine Works, Rockford, Ill., has developed the Series UK



**DRILL and
PILOT
BUSHINGS
Frictionless
—Rotary**

For core drilling, T. C. and high speed boring, turret tool, piloting, etc. Won't stick or clog. Dust proof as a watch. Write for details.

GATCO ROTARY BUSHING CO.
42330 Ann Arbor Road, Plymouth, Michigan

For more data circle 476 on Reader Service Card

**Quick
Shipment on**

**TAPER
ATTACHMENTS**

For All Lathes—Old or New—
9" to 36" Swing

Write for Bulletin

MASTER-TAPER COMPANY
4531 N. Beacon St., Chicago 40
Excl. Mfrs. of Taper Attachments



**\$29.50
to
\$149.50**

For more data circle 477 on Reader Service Card

CLIPPER

PRECISION DIAMOND TOOLS

Industrial Diamonds

Thread Grinders
Turning Tools
Engraving Tools
Dressing Tools
Diamond Powder



Manufacturers of
**DIAMOND
WHEELS**

and Hones of
highest quality.
Prompt delivery.

Ask for literature

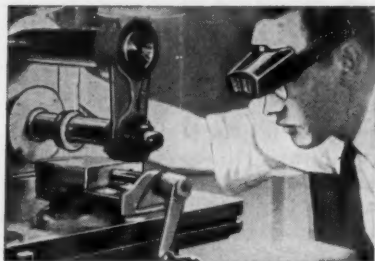
Representatives in Principal Cities

CLIPPER DIAMOND TOOL CO., INC.

345-C HUDSON ST., NEW YORK 14, N. Y.

For more data circle 478 on Reader Service Card

People work better when they SEE BETTER®



In Bell Telephone Laboratories:
*Precision machinist working on a mill-
ing machine finds Magni-Focuser an
invaluable seeing aid.*

MAGNI-FOCUSER's
matched prismatic lenses give needle-sharp mag-
nification. Comfortably light weight. Fits over
regular glasses. Leaves both hands free. Normal
vision may be resumed by lifting head.

MAGNI-FOCUSER

SPEEDS PRODUCTION

With Third Dimensional (3-D) Vision

Leaves both hands free to work

Magni-Focuser—the binocular magnifier—reduces
eye-strain and prevents squinting—thereby speed-
ing production, increasing accuracy and minimiz-
ing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and
die work are just a few of the jobs that need the
Magni-Focuser. Speeds precision assemblies, blue
print work. Restores the usefulness of the skilled
hands of many older workers whose vision needs
a seeing aid.

Magni-Focuser can help your plant produce better.
Immediate delivery. 10-day trial without obliga-
tion. Return to us if not satisfied. \$10.50.

Send for descriptive folder

EDROY PRODUCTS CO.

480 Lexington Ave.,
Dept. P, New York 17, N. Y.

For more data circle 479 on Reader Service Card

new shop equipment . . .

Traveling Wheel Face Grinder, designed for precision grinding of long or bulky workpieces at 90 degrees to the wheel face. This heavy-duty production machine has been improved to provide greater horsepower for heavier stock removal and a heavier carriage for improved precision.

STANDARDIZED MICRO DRILL GUIDES

All standard body styles available with hole sizes from #80 to $\frac{1}{32}$ ". Tolerances of .0002 maintained on I.D., O.D., and concentricity.

ENGINEERED MICRO-TOOLING, DRILLS, JIGS, COLLETS, ETC.

**MICRO
DRILL
GUIDE**



3980
Superior Ave.,
Cincinnati 36,
Ohio

For more data circle 480 on Reader Service Card

KEO

CENTER REAMERS

•
**HIGH SPEED
STEEL**

•
3 FLUTES



Cuts from $\frac{1}{4}$ " to 1". Furnished with 60, 82, 90, 100, 110 or 120 degree included angle. Large stocks on hand. Other angles are special. Let us quote.

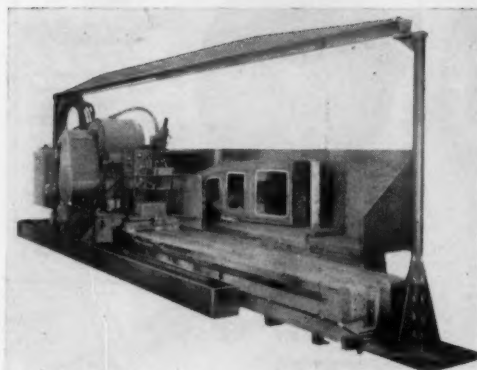
Jobbers' Inquiries Invited

KEO CUTTERS

19326 Woodward • Detroit 3 Mich.

For more data circle 481 on Reader Service Card

284 modern machine shop



Mattison "UK" Traveling Wheel Face Grinder

In operation, the part, no matter how large, is clamped in a stationary position and the grinding wheel passes over the surface to be ground. The stationary table permits the use of fixtures and clamps as heavy as the work demands. There is little likelihood of the piece tearing loose. Work of almost any length can be ground, because one end is supported by the grinder's table and the other end by means of supplemental blocking.

Carriage ways are one-third longer and wider in the redesigned machines. Although a heavier carriage is used, the new ways reduce the pounds per square inch loading for better performance. Use of a heavier carriage is said

Magnetic Base Indicator holders



Erick
**Magna Holder
Model 200B**
Only \$5.45

See your dealer or write for catalogue 755 on the most complete line of magnetic base units & access. mfg'd.

CULLEN MFG. CO., RACINE, WIS.

For more data circle 482 on Reader Service Card

July, 1956

MATTHEWS MARKING MACHINES

OTHER MACHINES

In addition to machines shown, Matthews has other General and Special Purpose Marking Machines, or they will engineer special machines for unusual marking applications. Write for recommendations, giving complete details of your marking requirements.

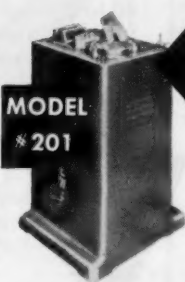
A pneumatically operated General Purpose Machine for marking up to 800 flat, round, or contoured parts per hour.



MODEL
237

MODEL
201

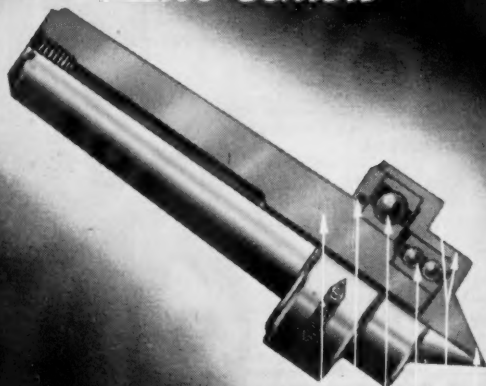
A Motorized Rotary Machine for automatically marking up to 7,000 cylindrical or conical parts per hour.



JAS. H. MATTHEWS & CO.
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ENGINEERED *Live Centers*



Standard shanks with Morse tapers carried in stock. Send us your specifications and blueprints - we will see that your job is set up with the right LIVE CENTER.

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LARGE THRUST BEARING
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new shop equipment . . .

to improve stock removal and precision and a newly designed carriage drive increases efficiency. The carriage is driven by a variable volume piston-type hydraulic pump in conjunction with a vane-type fluid motor. Complete control of all machine functions

is governed by a servo mechanism. Rate of speed, start, stop, inching and positioning for unloading are controlled by pushbuttons from the operator's seat on the traveling wheel carriage. Speed of the carriage has been increased to a range of 10 to 100 feet per minute. Horsepower driving the grinding wheel has been increased.

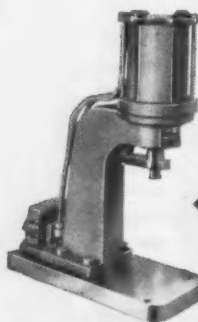
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★ ★ ★ ★ ★

SAVE!

WITH A HANNIFIN AIR PRESS

It's the ideal press for that occasional pressing job. These presses operate off ordinary shop air supply. They're fast and safe. Over 30 models to choose from...many for either bench or floor mounting. Capacities from ½ to 18 tons. Daylight to 46 inches...reach to 12 inches. Prompt delivery.

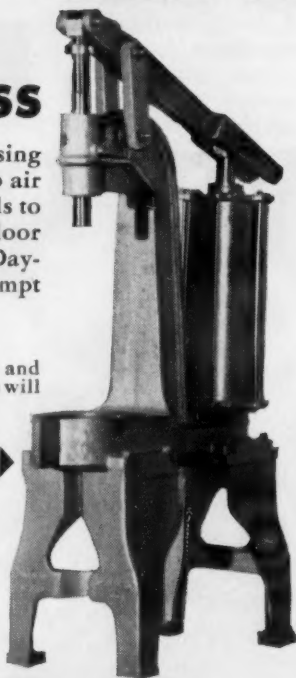


WRITE. Complete information and prices on Hannifin Air Presses will be sent on request.

6 Tons (Model B-2) One of more than 30 models. Press with base, \$554.

1-ton Hand-D-Press. For small parts manufacturers. Press, \$232.

Prices F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.



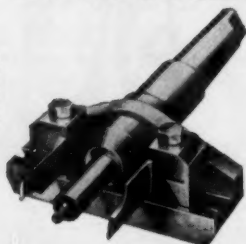
HANNIFIN

HANNIFIN CORPORATION, 565 S. WOLF ROAD, DES PLAINES, ILLINOIS

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Finished holes
1½" to 11¾"
diameter to a
depth of 8" on
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BOREMASTER is not just another Trepanning Cutter, but a real heavy duty tool. Stock is removed in one piece eliminating waste. Remember . . .

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= COST SAVINGS

• Write us today for complete details!

NEISE
MODERN TOOLS

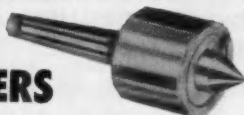
KARL A. NEISE
404 4th Ave., Dept. MMS,
New York 16, N. Y.

For more data circle 486 on Reader Service Card

**MANHATTAN'S MIRACLES!
TOP VALUE — LOWEST PRICE**

HEAVY DUTY

**LIVE
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#2 Morse Taper \$15.00

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**SAVE
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Hardened and ground • Sealed roller ball
bearings • Accurate free-turning point
Precision made in Western Germany

For tremendous savings, write for
circular listing sensational bargains.

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The Cutting Tool Discount House
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Telephone: CAnal 6-4992

For more data circle 487 on Reader Service Card

CHECK YOUR BENDING PROBLEMS HERE:

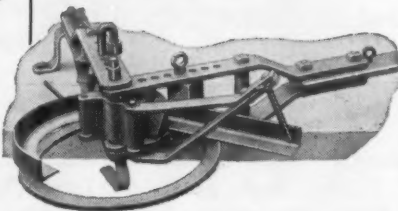
These are representative of the 101 different bends you can quickly set up with a

- | | |
|---|---|
| <input type="checkbox"/> Pipe | <input type="checkbox"/> Rings, Coils |
| <input type="checkbox"/> 90° Bends on Heavywall or Standard Pipe | <input type="checkbox"/> Centering Large Diameter Eyes |
| <input type="checkbox"/> Steel Tubing | <input type="checkbox"/> Sharp, Square Bends on Flat Stock |
| <input type="checkbox"/> "U" Shapes, "U" Bolts, Square Cornered "U" Bolts, Clevises, Hooks, Links | <input type="checkbox"/> Flat Eyes, Automobile Spring Eyes |
| <input type="checkbox"/> Angles, Offsets | <input type="checkbox"/> Angle Iron Flange In or Out |
| <input type="checkbox"/> Square Bends, Irregular Shapes on Flat Stock | <input type="checkbox"/> Flat Stock Edgeways |
| <input type="checkbox"/> Eye Bolts, "S" Shapes, Round or Square Stock | <input type="checkbox"/> Round or Square Eyes on Flat Stock, Wire |
| | <input type="checkbox"/> Conduit, Heavy or Thinwall |

HOSSFELD

UNIVERSAL®

IRON BENDER



Get The Facts!

Write for bulletin showing bender models, standard and special dies, and illustrations of bends.

The Hossfeld Universal Iron Bender is indispensable for maintenance and production work in metalworking, custom welding and repair shops, industrial and engineering plants, institutions and vocational departments in colleges, universities, trade and high schools. It replaces special bending equipment. A Hydraulic Attachment (optional) enables one man to bend heavier material.

HOSSFELD MFG. CO.

402 W. 3rd Street

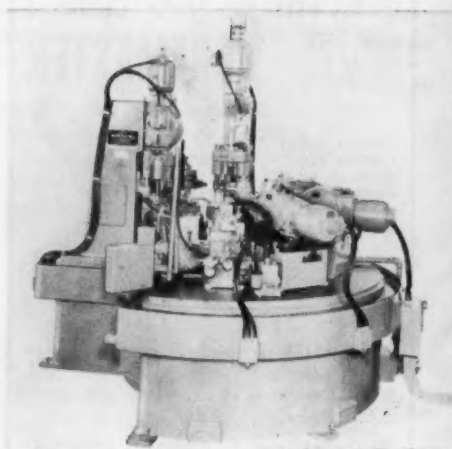
Winona, Minnesota

For more data circle 488 on Reader Service Card

new shop equipment . . .

12-STATION HORIZONTAL INDEXING, DRILLING AND MILLING MACHINE

The twelve-station horizontal indexing, drilling and milling machine illustrated herewith, product of the Machine Tool Division, The Hartford Special Machinery Co., 275 Homestead Ave., Hartford 12, Conn., is designed to drill, tap, slot, straddle mill and broach nine different brass throttle shafts. Five cam feed drill units, one lead screw tapping unit and one air operated broach are used to process the parts. Four drill units with milling attachments are mounted horizontally, and one vertically. The lead screw tapping unit is mounted vertically. Parts are loaded in a vee-block with hand screw clamp and automatically indexed through the processing cycle. The



View of Hartford Twelve-Station Horizontal Indexing, Drilling and Milling Machine

production rate of the unit at 100 per cent efficiency is 600 parts per hour. For more data circle 104 on Reader Service Card

A good machinist
looks first to the
COLLET!...and
first in COLLETS is



RIVETT!

Stocked in all standard styles for immediate delivery. Fractional round sizes and decimal equivalents from 1/64" to capacity; square, hexagon and taper holes. Transparent packaging for easy identification.

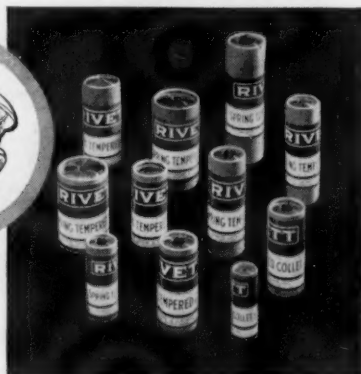


Write for Bulletin 100E

RIVETT LATHE & GRINDER, INC.

Dept. MMC7, Brighton 35, Boston, Massachusetts

For more data circle 489 on Reader Service Card



Collets for all lathes including American, Atlas, Axelson, Cincinnati, Hardinge, LeBlond, Lodge & Shipley, Logan, Rivett, Rockford, Sheldon, South Bend.



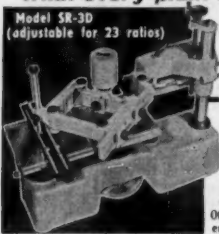
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BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.

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Wilmerding, Pa.

For more data circle 490 on Reader Service Card

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Model 58-3D
(adjustable for 23 ratios)



...the new all-purpose

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Other models exist to solve every
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CUTS THE COST OF STAMPING NUMBERS

MODEL 70

**MULTI-WHEEL
NUMBERING MACHINE**

The most efficient method of
stamping numbers into metal. Repeats the same numbers
until changed. Model 70
NUMBERALL Machines are
used in all industries to
mark various parts. Stamps
numbers, etc., quickly...
neatly. Perfectly aligned.
Much better marks are produced
than by single stamps or
steel type, and at a far
lower cost. Shank for Hand
or Press and with any number
of wheels from 3 to 20.
Can be furnished in 1/32"
to 3/8" high figures, sharp
face gothic or shaded roman
style.



Hand shank illustrated.
Press shank for foot or
power presses also available.

Write for Bulletin M5-70.

NUMBERALL STAMP & TOOL CO.
HUGUENOT PARK, STATEN ISLAND 12, N. Y.

For more data circle 492 on Reader Service Card

Get the complete, revealing

Inside Story...

**on the finest tapping
heads ever made!**

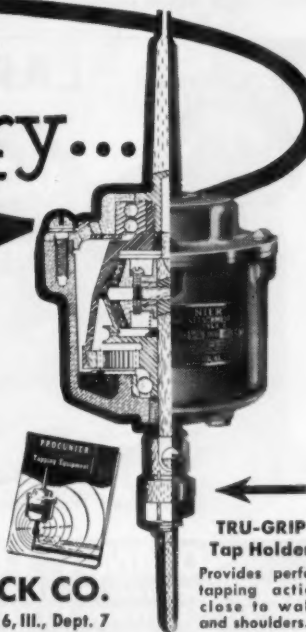
A complete feature by feature analysis on the amazing
Proconier Tapping Line is yours for the asking! Shows the many
outstanding construction improvements, mechanical advancements
and precision quality operating advantages that make
Proconier heads a "must" in production plants everywhere!
You'll learn why Proconier means more tapping hours with
minimum "down-time", faster production, with fewer broken
taps, fewer spoiled pieces and a "new-found" operating ease
that helps operators maintain stepped-up production schedules.

Write for **FREE Brochure** giving full details and specifications
on the Proconier Line.

PROCONIER SAFETY CHUCK CO.

12 S. Clinton St., Chicago 6, Ill., Dept. 7

For more data circle 493 on Reader Service Card



**TRU-GRIP
Tap Holder**

Provides perfect
tapping action
close to walls
and shoulders.

July, 1956

modern machine shop 289

new shop equipment . . .

METAL CUTTING BAND SAW FOR PRODUCTION CUT-OFF WORK

Designated as the Model 1000, a large capacity production machine, equipped to handle rounds to 10 inches and rectangular shapes 10 x 16 inches with extra capacity for end cuts up to 11 inches in diameter, has been announced by Wells Manufacturing Corp., 808 Tyler St., Three Rivers, Mich. It is driven by a $\frac{3}{4}$ h.p. ball bearing motor and uses 1 inch wide blades. The structural rigidity of the machine, produced by the design of its rugged counterbalanced frame and guide beam and its special heavy duty blade guides, provides greater accuracy and efficiency in production cut-off work.

Other design features are the "Constant-load" blade tensioning device, se-



View Wells Model 1000 Production Machine

lective speeds of 50, 100, 175, and 275 f.p.m., hydraulic frame check and swivel vise to 45 degrees. Height to top of bed is $25\frac{1}{2}$ inches; width of bed is $10\frac{1}{4}$ inches; floor space occupied by the machine is 24 x 72 inches.

For more data circle 105 on Reader Service Card



LARGEST variety of . . .

standard circular FORM TOOLS and BLANKS.

Over 600 sizes carried in stock for IMMEDIATE DELIVERY.

It's no longer necessary or economical to "hand grind" tools or purchase "made to order" tools for short run jobs. Let SOMMA STANDARD CIRCULAR

FORM TOOLS give you uniform, correct dimensions, better finish and appearance, less set-up trouble. In short—maximum production at the lowest cost.

Send for new catalog now listing DAVENPORT STANDARD TOOLS and BLANKS as well as many new sizes of BROWN & SHARPE STANDARD TOOLS and BLANKS.

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For more data circle 494 on Reader Service Card

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NIELSEN TRANSFER SCREWS**

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 8 sizes, from 3/16" to 3/4" U.S.S. Inexpensive — Last for years.



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For more data circle 495 on Reader Service Card

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JIG BORING



A SPECIALIZED CAM
MILLING SERVICE,
JIG BORING
... SPOT WELDING
... CONTRACT PRODUCTION
EXPERIMENTAL DEVELOPMENT

SEND FOR NEW CATALOG NO 52-CN

EISLER ENGINEERING CO., INC.
734 S. 13TH ST., NEWARK 3, N. J.

For more data circle 496 on Reader Service Card

ROB INC
ROB INC
ROB INC

SAWING

**GRAFTON
SAWING**

For more data circle 497 on Reader Service Card
July, 1956

**THE ANSWER
to some difficult
RIVETING
PROBLEMS**

For Example:



This toy has an unsupported axle 1/8" diameter by 4 1/4" long. The Hill Riveter is able to peen it over snugly WITHOUT DISTORTION in a timed cycle of 2 1/4 seconds using 15 psi air.

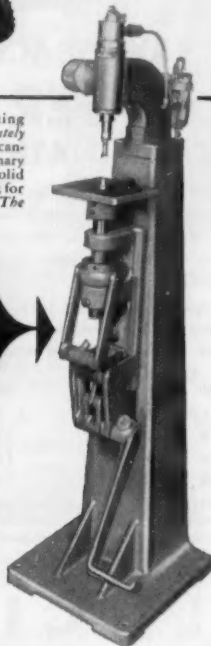
This air-operated riveting machine produces accurately controllable results that cannot be obtained on ordinary machines. For regular solid riveting, it is unbeatable; for difficult problems, it is *The Answer*.

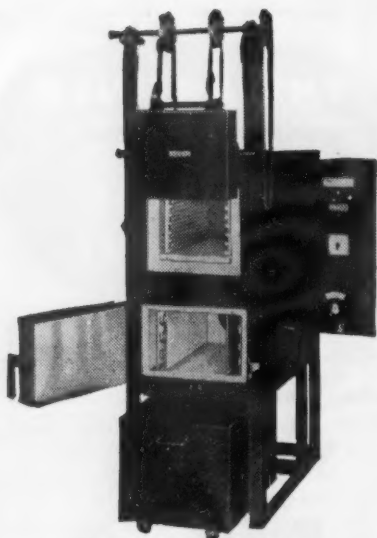
**THE HILL
PNEUMATIC
RIVETING
MACHINE**

Essentially, the machine consists of a revolving, air operated, reciprocating hammer, working against an anvil which is adjustable in a rigid bracket. For all details, and complete specifications, write for free bulletin: "High Speed Production Riveting."

HILL MACHINE COMPANY

1301 EDDY AVE., ROCKFORD, ILLINOIS
For more data circle 498 on Reader Service Card
modern machine shop 291





SAVE SPACE WITH A **LUCIFER #8055** COMBINATION MODEL

Two independent furnaces (hardening and drawing) in the same floor space one requires. Complete with independent controls. Hardening furnace available in both a 2000° and a 2300° F. range.

Drawing furnace has a maximum of 800° F. Quench tank included with the exception of the largest standard model.

Chamber Size			Prices	
H.	W.	L.	2000° F.	2300° F.
6"	6"	12"	\$ 750.00	\$ 850.00
9"	9"	18"	1150.00	1250.00
12"	12"	24"	1600.00	1700.00
18"	18"	36"	2400.00	2500.00

WRITE FOR FREE LITERATURE, SPECIFICATIONS and price list of Lucifer Furnaces in wide range of sizes—top loading and side loading types. Engineering advice without obligation. Write, wire or phone today.

LUCIFER FURNACES, INC.

NESHAMINY 6, PA.

Phone Osborne 5-0411

For more data circle 499 on Reader Service Card

292 modern machine shop

new shop equipment . . .

AUTOMATIC CENTER-LAPPING MACHINE

An new concept in center-lapping high production parts was revealed recently in a completely automatic machine, engineered and developed by Industrial Metal Products Corp., Lansing, Mich. In operation, parts are fed from a conveyor onto an inclined magazine loader, then set automatically in the workholding fixture, hydraulically clamped, center-lapped on both ends and ejected onto the unload track at the rate of 300 pieces per hour.

The machine employs two "Impco" center-lapping units. Each is equipped with an automatic dresser, which dresses the stone after each cycle, or as required, and resets itself to adjust for amount of stone removed. The units are also equipped with automatic control panel lights that flash on when stones have been used to minimum length and to indicate that the machine has shut off and reset itself automatically for new lapping stones.

For more data circle 106 on Reader Service Card



Industrial Automatic Center-Lapping Machine

July, 1956

DIAMETER GAGED AND AUTOMATICALLY STAMPED ON AUTOMOBILE PISTONS BY ELECTRONIC GAGE

An electronic gage, that measures taper and outside diameter on automobile pistons, then stamps a code letter on the piston to identify the diameter, has been introduced by Federal Products Corp., 6144 Eddy St., Providence 1, Rhode Island.

This gage takes both measurements; i.e., taper between the top and the bottom of the piston skirt and the o.d. at the upper end of the skirt, simultaneously. However, if the taper measurement is not within tolerance limits, the gage's electronic classifier will ignore the diameter measurement and the part is rejected. If the taper is okay, there are six good diameter classifications differing by 0.0003 inch plus oversize and undersize. Signal lights for each diameter classification enable the operator to see at a glance which category a particular piston falls into, and an ink impregnated stamper unit

automatically stamps the code letter indicating the correct diameter on the piston itself.

The use of a gage like this, which stamps the diameter code indelibly on the part, can reduce both assembly time and errors. Even if the part should be mis-sorted, it can easily be placed where it belongs merely by glancing at the code letter and, when assembling,

LUFKIN LEVELS provide the perfect alignment vital to Automation



Automation machinery requires perfect alignment to operate smoothly and economically. Stoppages can be reduced using reliable Lufkin Levels for installation and maintenance.

No. 59

LUFKIN MASTER PRECISION LEVELS

Hand scraped bases on Lufkin Master Precision Levels provide accurate surfaces for true horizontal settings to 10-second accuracy. Each division on graduated glass vial equals .0005 in. per ft. Special aged iron alloy base is extremely rigid and has less temperature change. Has tamper-proof adjustment and non-conductive top plate. Height 3", length 15", width 1 1/2".

LUFKIN MACHINIST'S LEVELS WITH "V-GROOVE" BASE

"V-GROOVE" bases have a broader bearing surface and seat more accurately on any size shaft. Choice of plain or graduated glass vials. 60-second accuracy with one division equaling .0035 in. per ft. Cross and plumb vials. Tube-covered main vial. 6", 8", 12" and 18" lengths.



NO. 57 & NO. 58

BUY **LUFKIN** TAPES • RULES • PRECISION TOOLS

430 FROM YOUR INDUSTRIAL DISTRIBUTOR

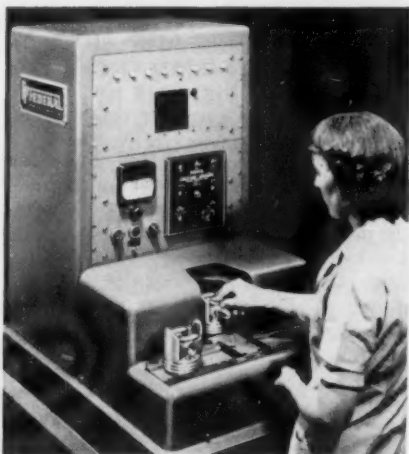
THE LUFKIN RULE CO. SAGINAW, MICHIGAN

For more data circle 500 on Reader Service Card

new shop equipment . . .

it is a simple matter to match up parts which have similar code letters.

This gage, designated as the Model No. 144 B-83, is semi-automatic. That is, the gaging and stamping action is entirely automatic, but the parts are hand fed and hand disposed. Gages



Federal Model No. 144 B-83 Electronic Gage

with fully automatic feeding and sorting units are available. With this model, the operator places a piston on a precision-ground locating plug, which is said to assure positive centralization of the part in the gage.

After the part is located properly, a switch is tripped which starts a vibrator that settles the part firmly between the gaging contacts. Both the taper and diameter measurements are made simultaneously, and the electronic classifier receives the size signals from the gage heads. The classifier lights the proper signal light and activates the stamper unit. When the piston is re-



PART FEEDER

Automatic Part Feeders are adaptable to production jobs requiring the handling of small parts. Parts poured into hopper are arranged and fed down track in proper order.



Single & Multiple Spindle Magazine Feed Power Screw Driving Machines

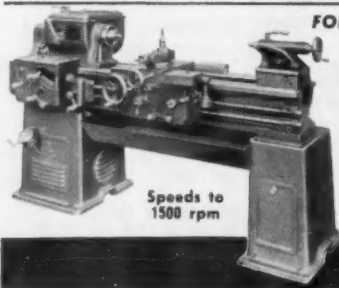
For driving screws faster in products assembled with screws. These machines operate easily and require very little attention or adjustment when put in production.

Send sample parts when writing for quotation.

COOK & CHICK CO.

2415 WEST 24TH ST., CHICAGO 8, ILL.

For more data circle 501 on Reader Service Card



FOR FAST, ACCURATE TURNING AT LOWEST COSTS

NEW C & J 16\"/>

- Standard taper key drive spindle nose
- Heavy duty precision Timken tapered bearings on spindle
- WRITE FOR BULLETIN A56V5

**ALSO NEW
18\"/>**

**Carroll - Jamieson Machine Tool Co.
BATAVIA, OHIO, U.S.A.**

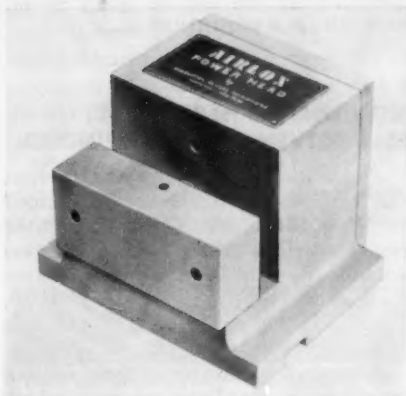
For more data circle 502 on Reader Service Card

leased by the stamper, the operator places it in the disposal box as indicated by the signal light. The gaging cycle takes approximately $4\frac{1}{2}$ seconds. For more data circle 107 on Reader Service Card

★ ★ ★

NEW POWER HEAD

Production Devices, Inc., Whitehall, N. Y., has announced its latest addition to the Airlox line of pneumatic devices; namely, the Power-Head. This Power-Head is designed to power fixtures on machine tools, on welding operations or on assembly where 1,200 lb. or less is adequate force on the work. The Power-Head can be used singly or in series; horizontally or vertically; and with manual or automatic controls. The head has a guided air-operated movable jaw with 1 inch stroke and spring return. Developed



View of Airlox Model No. 400 Power-Head

push is $12\frac{1}{2}$ times air line pressure. The Airlox Model No. 400 Power-Head is supplied complete with hand or foot valve and air hose assembly. For more data circle 108 on Reader Service Card

MARVECO

... has a very plain, simple guarantee. MARVECO live centers are guaranteed to outperform and outlast ANY OTHER LIVE CENTER MADE ... no ifs, ands or buts!

Compare quality and price — the best buy is MARVECO.

CALL YOUR LOCAL DISTRIBUTOR OR WRITE

MARVEL TOOL & MACHINE CO.
1092 NO. RIVER ROAD ST. CLAIR, MICH.

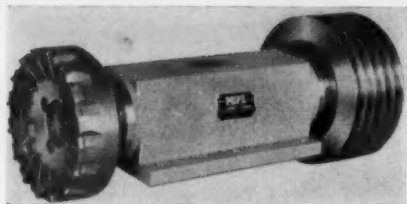
For more data circle 503 on Reader Service Card

new shop equipment . . .

NEW LINE OF HEAVY-DUTY BELT DRIVEN MILLING SPINDLES

A new line of heavy-duty belt driven milling spindles has been announced by Pope Machinery Corp., 261 River St., Haverhill, Mass. This precision spindle is available in a range of sizes from 1 to 50 h.p., with standard No. 10, 20, 30, 40, 50 or 60 milling machine noses.

Noteworthy features of these milling spindles are the bearings with which they are equipped. Two big cylindrical roller bearings carry the radial loads. Their bores are tapered, as are the massive shafts in these spindles so that the bearings may be individually preloaded. A pair of precision thrust bearings are likewise permanently preloaded to stabilize the shaft axially against



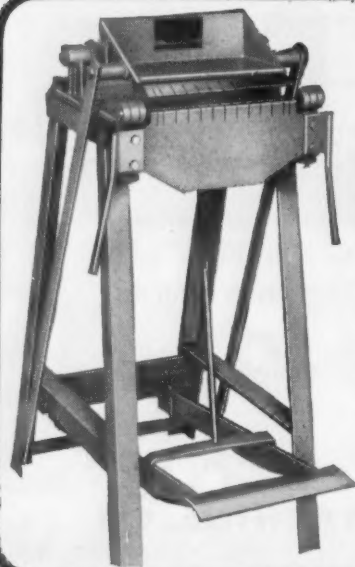
Pope Heavy-Duty Belt Driven Milling Spindles

endwise movement in either direction.

The Pope system of lubrication is claimed to permanently lubricate the bearings for their entire operating life and the milling spindles run at low temperature.

Pope heavy-duty milling spindles may be arranged to operate in any position the user specifies. These heavy-duty type spindles are also available with totally enclosed, fan-cooled motor drives from 1 to 100 h.p.

For more data circle 109 on Reader Service Card



BEND DRUM RETURN FOR LETTERS FASTER!

**WHITNEY-JENSEN No. 99
Letter Forming Bending Brakes**

**3/16" SLOTS
9/16" DEEP ON
1" & 1/2" CENTERS
ACCOMMODATE
SEAMED & FOLDED
DRUM RETURN**

**CLAMPING BY
FOOT TREADLE**

**CAPACITY 20 GA.
INCLUDING
STAINLESS**

HEIGHT 39"

**WEIGHT ONLY
50 LBS. FOR
EASY MOVING**

**WHITNEY METAL TOOL COMPANY
720 Forbes St., Rockford, Ill. Since 1910**

For more data circle 504 on Reader Service Card

MICRO-HARDNESS TESTER

A new combination micro-hardness tester and metallurgical microscope, of non-destructive type, with a load-weight range of from 25 to 1,000 grams, and requiring only one minute for a complete test cycle, has been announced by The Sheffield Corp., Dayton 1, Ohio. Interchangeable vise accessories permit this instrument to be used for testing small precision ground or lapped parts, small diameter wires, very thin materials or material coatings, thin sheet stock, cutting tool edges and ball bearings.

It is a practical instrument for a shop as well as a laboratory, since it is fast and easy to operate and requires no special skills. A green light in the head of the instrument shows when the indenter is in contact with the work, and a red light indicates when load cycle is complete.

Vertical capacity is $2\frac{3}{8}$ inches, and the maximum spread of standard vise

jaws is $1\frac{11}{16}$ inches. Surface finishes of 40 r.m.s. or less can be inspected, and indentations of 0.0004 inch or smaller can be measured to within an accuracy of 0.00008 inch. The spot to be indented can be located to within an accuracy of 0.0002 inch.

The workpiece is raised to the indenter by a handwheel. A specially designed loading system, with the load applied in a direct vertical motion per-

C A M S

Fully equipped modern machine shop with extensive **Jig Boring, Surface Grinding, Horizontal Boring and Thread Grinding** facilities as well as modern **Cam Milling and Cam Grinding** equipment.

Your Inquiries Answered Promptly

HIMOFF MACHINE CO., INC.

23-16 44th Road Long Island City 1, N. Y.

For more data circle 505 on Reader Service Card

Bringing you — Modern developments in plating processes and methods

HERE are the basic theories and principles of electroplating—the practical methods and processes that are of invaluable use to everyone concerned with electroplating and electrotyping. The most efficient methods of making electrodeposits on more than 40 different metals, alloys, and plastics are summarized completely in this thoroughly revised and enlarged book.



Principles of ELECTROPLATING & ELECTROFORMING

By William Blum, Chemist, U. S. Bureau of Standards and George B. Hogaboom, Consultant

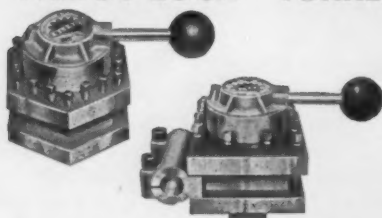
Revised 3rd Edition
455 pages, 6 x 9
24 tables, illus.
\$7.00.

Completely revised to make it a more practical working guide, this book summarizes and digests the best of modern practice in the field. It covers qualitative, quantitative analyses of solutions; pickling, dipping; electroplating; electroforming, electrotyping; producing phonograph record matrices, and manufacturing tubes, etc. Metals are dealt with in the same order as in the periodic system of elements.

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Does not raise up when indexing in all 12 positions. 4-way and 6-way block models. Repetitive accuracy to within .0003 plus or minus within itself.

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Makers of Combination Rotary Tables and Angle Plates. Also Helical Gear Speed Reducers, Single and Double Reduction. Also Special Gears of All Types.

Open territory available to representatives.

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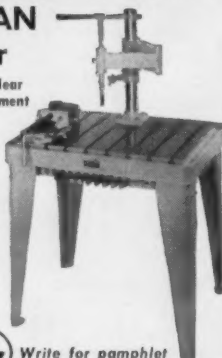
40 W. WATER ST. • WAKEFIELD, MASS.

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Save 70% of your present free hand tapping time with this

NEW ALLMAN hand tapper

- Articulate arm swings clear of large table for placement of work
- Limitless number and sizes of tapped holes without moving work piece
- Vise holds work as small as $\frac{1}{8}$ " square
- Floating tap locates itself in hole
- Individual spindle holds taps, thus change requires only seconds



TOOLS, INC.

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For more data circle 507 on Reader Service Card

298 modern machine shop

new shop equipment . . .



View of Sheffield Micro-Hardness Tester

pendicular to the work, is said to eliminate indenter side thrust and deformed indentations which might cause incorrect reading of hardness value.

When the instrument is used as a metallurgical microscope, the interchangeable objective lenses provide magnifications of 200X and 400X. A camera can be attached to the eyepiece for making photomicrographs.

For more data circle 110 on Reader Service Card

LIGHTWEIGHT FLEXIBLE SHAFT MACHINE

Model SJ38 is the designation for a new flexible shaft machine, recently announced by Stow Manufacturing Co., 1 Shear St., Binghamton, N. Y. The SJ38 is mounted on a pan and caster base with a carrying handle on top of the motor. Although the flexible

July, 1956



Stow Model SJ38 Flexible Shaft Machine in use

shaft is very light and easy to maneuver, it transmits up to 1/3 h.p. The three speeds that may be obtained with this machine are 1,000, 1,750 and 3,000

r.p.m. Two of the speeds may be obtained by connecting directly to the motor or to the countershaft. The third speed is obtained by interchanging the pulleys.

The SJ38 can be obtained with either a 5 or 6 foot flexible shaft. It is furnished standard with a high-speed handpiece. However, 1:1 or 2:1 speed ratio right angleheads may be substituted for the handpiece, as shown in the illustration. In the photograph, the welds on a motor mounting plate are being ground down with the aid of a sanding disc.

The SJ38 can be used for buffing, sanding, wire brushing, drilling, reaming and grinding. The belt and pulleys are completely guarded. It is available with either a 1/4 or 1/3 h.p. motor. This 3/8 inch flexible shaft is built for long durability and the core is constructed of high grade music wire.

For more data circle 111 on Reader Service Card

HIGH SPEED PRODUCTION CONTINUOUS OIL GROOVING

WICACO CONTINUOUS OIL GROOVER cuts grooves of all descriptions, internal or external, continuous or intermittent.

Send us samples for grooving. We will return them cut to specifications, with a record of time and cost estimate. No obligation.

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MACHINE CORPORATION

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1868

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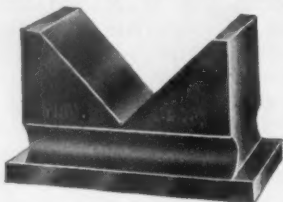
MANUFACTURERS OF

**Precision Machinery and Machine Parts
Roller Bearing Twister Spindles—Spindle Oiling Machine
—Screw Machine Products.**



For more data circle 508 on Reader Service Card

SEMI-PRECISION "V" BLOCKS FOR ALL-AROUND SHOP USE



Stock No.	Base	Capacity	Net Price Ea.
10	4 1/2" x 3"	2 3/4" dia.	\$ 8.00
11	6 1/2" x 4"	4 1/4" dia.	16.25

Sturdily designed for hard usage . . . Accurately machined from close-grain iron . . . Ideal for drill presses, milling machines, shapers and planers. Will test round shafting for straightness . . . Economically priced.

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ACME TOOL COMPANY

71 West Broadway • New York 7, N. Y.

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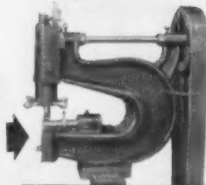
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TO INCREASE
PROFITS

TO SAVE
TIME

TUBE CUTTING
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SPECIAL TUBING-ENDS — USING GUIDE-LINE
OR TEMPLATE.

TUBE-CUTTING ATTACHMENTS EASILY
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KNOXVILLE

Since 1885

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NIBBLING MACHINE PIONEERS

For more data circle 510 on Reader Service Card

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GRAM GAGE MEASURES MINUTE PRESSURES

A Gram Gage, for measuring minute pressures having a range of 0.5 to 5 grams, has been added by the George Scherr Co., Inc., 200-MM Lafayette St., New York 12, N. Y. to its line of precision dynamometers, which are also known as gram gages or spring tension gages. Thus, checking of spring tension far below the present range of available instruments has become a reality. Low cost and ease of application will enthuse all manufacturers of fine instruments, especially in the electronics industry.

Illustrated in use for checking brush tension on a Synchro, this tool will be the answer to most problems concerning measuring of extremely low pressure. The Scherr Precision Dynamometer line now covers a total range from 0.5 to 1,000 grams or its equivalent in ounces, using only nine gages. The first six gages have a dial diameter of 1 1/2 inches and the three larger ones 2 1/2 inch diameter. The nine gages have the following pressure ranges: 0.5 to 5 grams, 2 to 15 grams, 3 to 30 grams, 5 to 50 grams, 10 to 100 grams, 15 to 150 grams, 25 to 250 grams, 50 to 500 grams and 100 to 1,000 grams.

For more data circle 112 on Reader Service Card

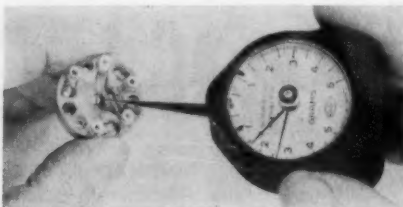


Illustration showing Scherr Gram Gage being used to check brush tension on Synchro

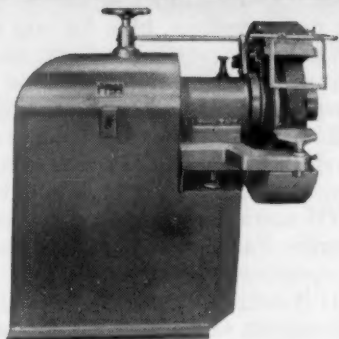
July, 1956

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Maximum performance . . . production . . .
economy . . . quality . . . speed . . . with
minimum cost of operation and maintenance



UNITED STATES ELECTRICAL TOOL COMPANY GRINDERS
for every purpose . . . for every industry




**NOW NEW! SINGLE END VARI-SPEED
SNAGGING GRINDER 7½ TO 20 HP
MODEL 61 VS**

Ideal stub user. Constant peripheral speed regardless of wheel diameter for increased production and longer wheel life. For vitrified or high speed grinding wheels.



**GENERAL PURPOSE FLOOR GRINDER
MODEL 500**

Totally enclosed motor, 1 to 5 hp. Push button starting with overload protection. Ball bearings enclosed in dust-tight housings. Enclosed adjustable wheel guards.

You need these  **tools . . .**

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Floor
GRINDERS
Angle plate
Bench
Brake drum
Floor
Portable
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Swing Frame

Tool post
Vertical Spindle
Wet
DRILLS
Portable electric
DUST COLLECTORS
HEAT GUNS
DRILL STANDS
Post bracket

NUT SETTERS

SCREW DRIVERS
POLISHERS
Portable
Bench
Floor
SANDERS
Disc, portable
VALVE SEAT GRINDERS
and many other tools

THE UNITED STATES ELECTRICAL TOOL COMPANY

3646 Llewellyn Street,

Cincinnati 23, Ohio

For more data circle 512 on Reader Service Card



Press Time Brief

BULLARD FOUNDRY

Shown below is an aerial view of The Bullard Company's new foundry, the most modern of its type in all of New England and one of the finest in the country. Costing seven million dollars this new facility of the company which is located in Fairfield, Connecticut was officially placed in operation last month.

The building is 600 feet long, 240 feet wide and 62½ feet high at the top of the cupola stacks. It provides 220,000 square feet of production, office and storage area. 3,300 tons of structural steel were required, 600 tons of steel reinforcing rod and 24,000 tons of concrete. The building contains approximately ten million cubic feet. The additional 220,000 square feet of manufacturing and servicing area of the Foundry brings

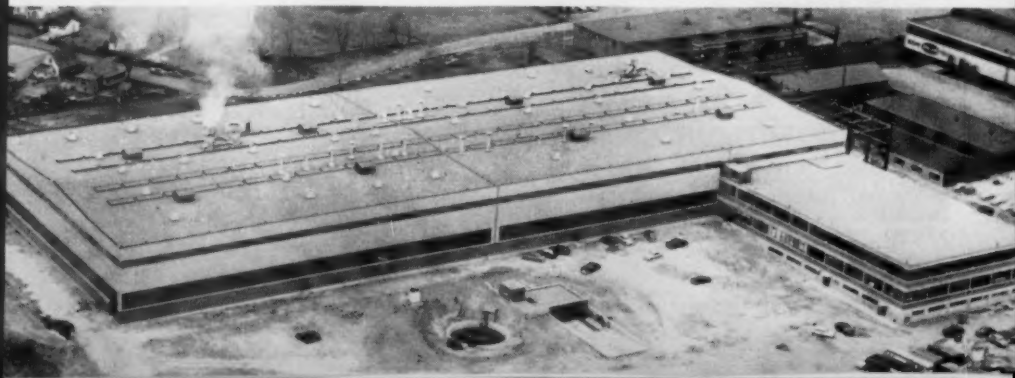
the company's total floor area to 1,034,000 square feet, located on a land area of about 63 acres.

More than ten miles of piping service the heating, plumbing and processing operations. All piping is color coded for quick servicing. Red for fire sprinklers, blue for city water, green for recirculated mill water, orange for natural gas, yellow for compressed air and brown for oil.

Three 600 horsepower boilers can produce 63,490 lbs. of steam hourly. This amount of steam would heat 1,000 average six room houses at 68 degrees Fahrenheit with an outside temperature of zero.

It is estimated that the annual requirements of natural gas for heating core ovens and pre-heating pouring ladles is sufficient to heat five hundred homes for a year.

It is in this new foundry that skilled craftsmen will make the quality grey iron castings which go into the manufacture of the world famous Bullard Cut Master and Man-Au-Trol Vertical Turret Lathes; Horizontal Boring, Milling and Drilling Machines; Vertical Chucking Grinders; Contin-U-Matics; and Mul-Au-Matics.



NOW... Wider Selection of Armco Stainless Bar and Wire

Newly expanded production facilities give you a wider selection of Armco Stainless Steel bar and wire—give you more to choose from three ways:

- 1. Larger stocks**
- 2. Greater lengths**
- 3. Wider range of shapes and sizes**

Delivery is faster too, with more than 50 standard and special Armco Stainless bar and wire grades available.

Consistent quality

You cut down on costly rejects because high quality Armco Stainless Steels machine uniformly, shipment after shipment.

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Sheffield Steel Division • Armco Drainage & Metal Products, Inc. • The Armco International Corporation

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where to get it

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**These Rubber-Cushioned,
MULTI-USE STOCK ABRASIVES
DO THE WORK OF SPECIALS....**

**GIVE A COMPLETELY NEW, WIDER CONCEPT
OF ABRASIVE APPLICATIONS**



**ASK Your Brightboy Dealer for This
New Catalog That Tells You How**

You can now select a readily-available STOCK Brightboy grain and texture exactly "job-matched" for special use. And you can also utilize its versatility for many other finishing applications!

Choose from a wide variety of abrasives in Silicon Carbide and Aluminum Oxide grains. Grains and textures range from extra fine to extra coarse—ALL in soft, firm or tough rubber binders.

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DIAMETERS TO 8"



Brightboy is also made in a full range of accessory products: Rods, sticks and blocks for machine and manual operations.

Ask your dealer to recommend Brightboy grains and textures ideally suited to your requirements. Write, without obligation, to our Service Department on any problem in which finishing is involved.

**BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO.**

95 North 13th Street • Newark 7, N. J.

*America's Pioneer Manufacturer
of Rubber-Bonded Abrasives*



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A New Concept of Vertical Measurement

The Webber Micro-Accurate OPTICAL HEIGHT GAGE

Employing TWO proven Principles of Precision
Measurement...Webber Gage Blocks and the
famed Leitz Measuring Microscope

Now, for the first time you can make vertical measurements up to 49" and be absolutely certain of their accuracy. No longer is special or expensive laboratory equipment needed. The workman himself can do his own inspecting, saving expense, speeding production and attaining an accuracy $\pm .000005$ " per inch of length up to the full 49" of height.

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In 25", 37" and 49" models.

Next to your gage blocks, the new Webber Optical Height Gage will be the most useful tool in your shop.

Webber
GAGE COMPANY

12899 Triskett Rd. • Cleveland 11, Ohio

LARGEST EXCLUSIVE MANUFACTURER OF PRECISION GAGE BLOCKS

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July, 1956

modern machine shop 307

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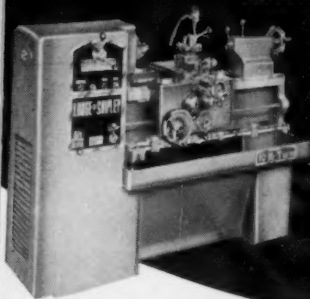
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*If the
question
is...*

PRODUCTION SPEED?
MULTIPLE-PIECE ACCURACY?
SMALL INVESTMENT?



Lodge & Shipley 10" HI-TURN is the answer!

The low base price includes electrical equipment, ammeter, direct reading cross feed dial, dial for apron hand-wheel, pan, multiple length stop arrangement for use with either flat or round templates, pump and tubing, etc.

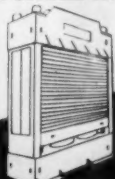
The Lodge & Shipley 10" HI-TURN Lathe is a completely new concept in lathes. Designed for high production at low cost, it eliminates rarely used features . . . includes many standard features never before found at any cost.

The result is a rugged lathe of high accuracy on single or multiple-piece work. Provides productive capacity at a price substantially below conventional lathes. We can prove more production per lathe dollar . . . more production per operator hour!

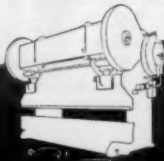
Find out about the Lodge & Shipley 10" HI-TURN. Write today for full, detailed literature, Bulletin 300, The Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

Proved-for-Production Features:

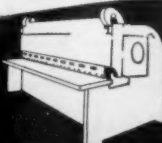
- 9 color-coded speeds up to 3000 RPM and 5 HP
- Totally enclosed 100% anti-friction quick change gear box with rugged all-spur gearing
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- Hardened and ground cross slide ways
- Direct reading cross feed and top slide dials
- Provision for rear tool block and multiple tools
- Magnetic feed clutch and brake
- And many others



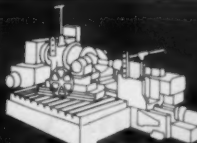
Hydraulic Presses



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Squaring Shears



Flatturn Machines



Lathes

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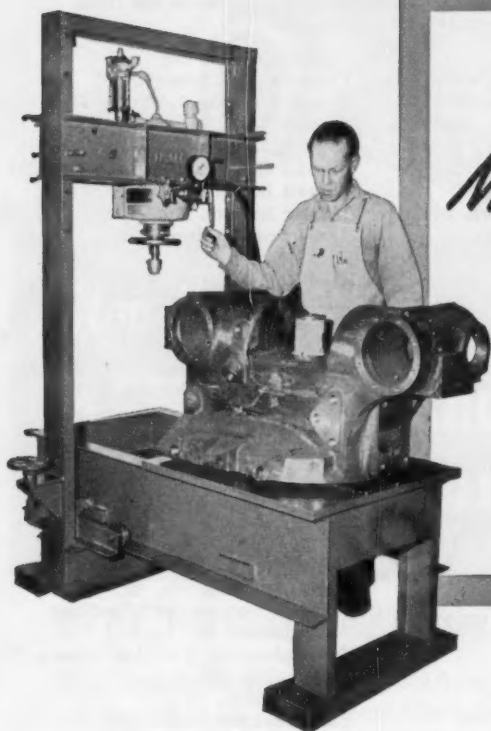
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Dake Movable Frame Presses

**let you move
the press
over the work**

If you have difficult pressing jobs, these gantry-type presses developed by Dake hydraulic engineers may be just what you need to handle them. Dake Movable Frame Presses enable you to bring the press to the work, instead of work to the press.

Awkward parts or assemblies are easily loaded on the work table by crane, hoist, or fork lift. Then one man can easily move the press frame over the part and move the workhead along the top channels to center it

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Dake Movable Frame Hydraulic Presses are designed for hand, electric, or pneumatic operation, and are available in thirteen models from 25 to 300 ton capacities. Complete information and specifications are given in Bulletin 269 . . . copy on request.

Look to Dake engineering for the answers to your pressing problems.

Dake Corporation, 612 Seventh St., Grand Haven, Mich.

**DAKE
PRESSES**



Arbor
Presses



Hand-Operated
Hydraulic



Power-Operated
Hydraulic



Guided
Platen



Gap Type
Presses



Movable
Frame

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1887

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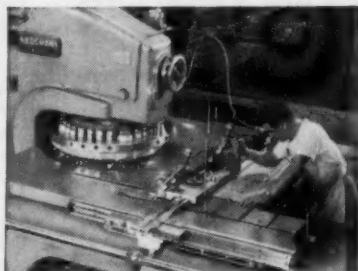


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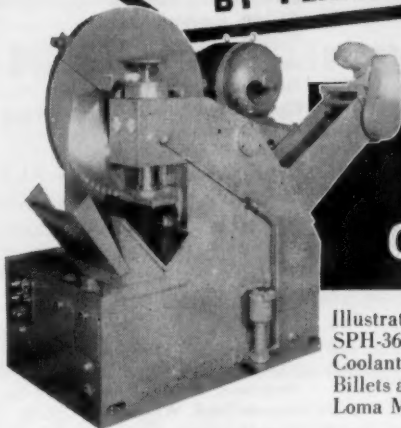
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BY PERFORMANCE



Ruthman Gusher Coolant Pumps

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The year in and year out popularity of Ruthman Gusher Coolant Pumps with the leading machine tool builders is ample proof of their outstanding performance.

Gusher Coolant Pumps give you split second coolant flow — require no priming. Their sturdy construction, pre-lubricated ball bearings, electronically balanced rotating assembly assure you of long trouble-free life with minimum maintenance.



THE RUTHMAN MACHINERY CO.



1817 READING ROAD

CINCINNATI 2, OHIO

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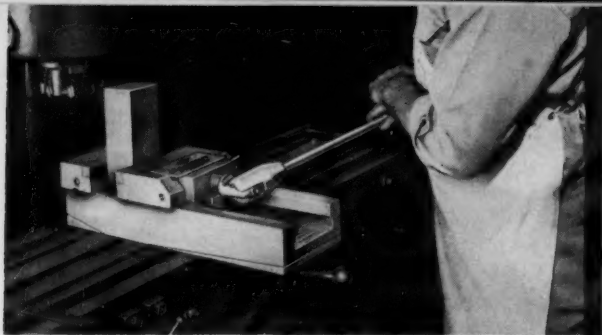
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**LARGE CAPACITY
HALF THE WEIGHT
MULTIPLE CLAMPING
POWER
FULLY ADJUSTABLE**

New milling vise

the only swivel vise that mounts flat on table...

The New J & S CLAMPCUT Milling Vise multiplies the clamping and holding power expected of a milling machine vise. The powerful Acme threads tighten the adjustable jaw head and the patented down holding clamping jaws multiply the pressure.

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**EASY TO USE
SNAPS TO WORK —
then tightens
READILY
DIS-ASSEMBLED
REVERSIBLE JAWS**

A quick-release taper swivel provides positive clamping in position with only two "T" bolts. The swivel is calibrated for full 180°.

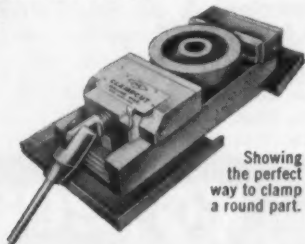
This fast loading vise is provided with exclusive "snap-on" parallels that cannot be clogged with chips.

Holds round pieces in vertical position and has adjustable stop for repeating operations quickly and accurately.

J & S CLAMPCUT Vises come in two sizes for 12" capacity and 8" capacity. Write for complete details and prices.

Quick finger release for setting and resetting any position for full range of vise.

Distributors in all industrial areas.



Showing
the perfect
way to clamp
a round part.

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TOOL CO. INC.**

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J & S TOOL CO., INC.

CLAMPCUT ONE 8471

**871 DORSA AVE.
LIVINGSTON, NEW JERSEY**

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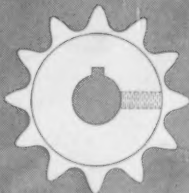
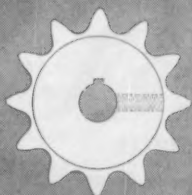
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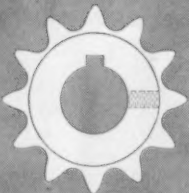
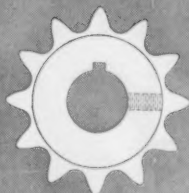
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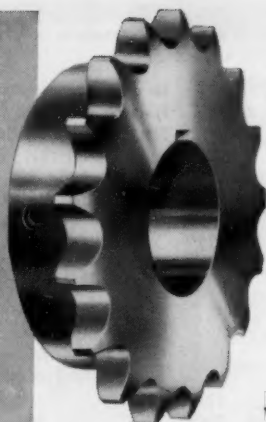
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FROM LOCAL STOCK
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Complete with Keyway and Setscrew

FINISH BORED—READY TO INSTALL. Single width steel sprockets $\frac{3}{8}$ " Pitch through 1" Pitch — in 76 commonly used Tooth Sizes—with a full selection of finished bore diameters for each sprocket.

YOU SAVE EXPENSE of reboring, keyway cutting, drilling and tapping for setscrew . . . and you get **BOSTON GEAR** quality, the top standard for precision and performance.

OFF-THE-SHELF DELIVERY from your nearby **BOSTON GEAR** Distributor. Consult his factory-trained specialist for complete information on Sprockets for any drive. Ask for Catalog 56. Boston Gear Works, 68 Hayward St., Quincy, Mass.

Call your **BOSTON** *gear*
DISTRIBUTOR

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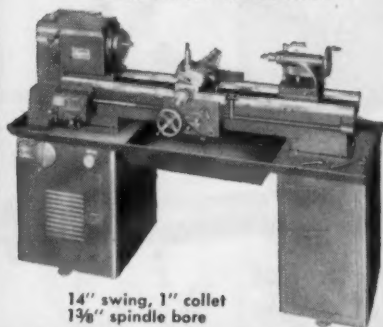
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Logan

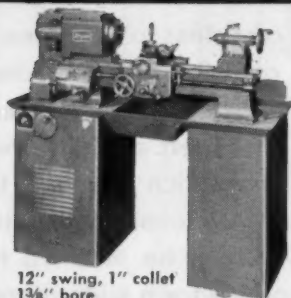
THE LATHES FOR
SUSTAINED ACCURACY



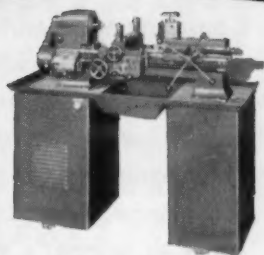
14" swing, 1" collet
1 3/8" spindle bore

You can continue to depend on Logans for precision results. On every type of lathe operation Logan sustained accuracy keeps performance at top efficiency. Ruggedly proportioned as well as precision built, Logan Lathes keep their accuracy after years of use in tool room, shop or production.

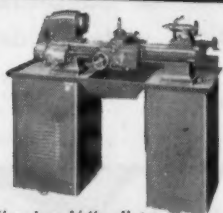
*Screw Cutting and Turret Lathes
In a Wide Range of Sizes
9", 10", 11", 12" and 14" swing, all
with Logan advanced design features.*



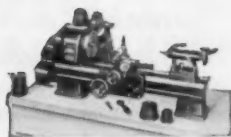
12" swing, 1" collet
1 3/8" bore



11" swing, 1" collet
1 3/8" bore



10" swing, 1/2" collet
25/32" bore



9" swing, 1/2" collet
25/32" bore

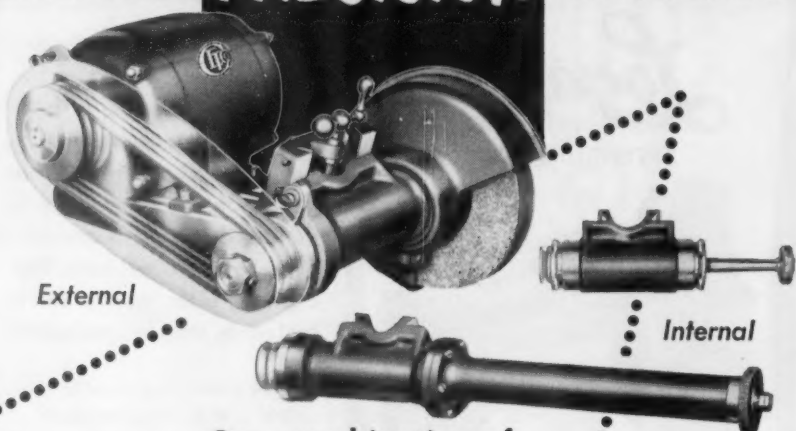
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The CINCINNATI ELECTRICAL TOOL CO.

Division of The R. K. LeBlond Machine Tool Co.

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July 1956 Issue

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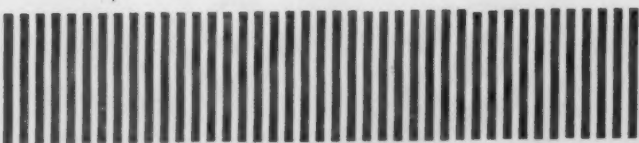
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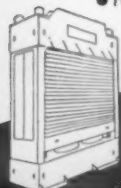
New literature details the ease of operation, effortless accuracy and notable economy of Lodge & Shipley Shears.

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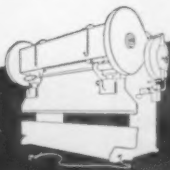
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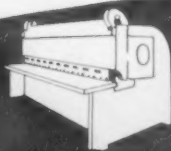
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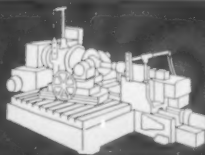
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Press Brakes



Squaring Shears



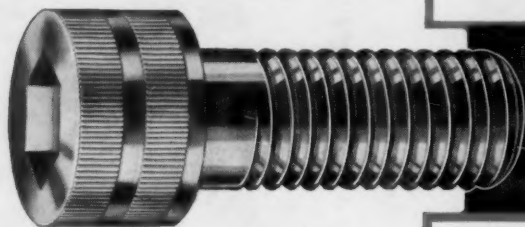
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Lathes

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Where countersinking is impractical.



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Precision threads for the tightest fit.



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Special finish is corrosion-resistant, facilitates driving.

